

【公報種別】特許法第17条の2の規定による補正の掲載

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【手続補正書】

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【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】0015

【補正方法】変更

【補正の内容】

【0015】

ここで、表皮層の材質は、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、面密度 $0.005 \sim 0.3 \text{ kg/m}^2$ 未満で、表皮層の厚みは15 mm以下であり、表皮層は吸音層より高密度に設定されている。

【手続補正2】

【補正対象書類名】明細書

【補正対象項目名】0023

【補正方法】変更

【補正の内容】

【0023】

ここで、凹凸部1個につき、表皮層と吸音層との接着部の面積は $0.5 \sim 100 \text{ cm}^2$ で空気層の面積は $1 \sim 100 \text{ cm}^2$ 、空気層の高さは $1 \sim 10 \text{ mm}$ である。

【手続補正3】

【補正対象書類名】明細書

【補正対象項目名】0030

【補正方法】変更

【補正の内容】

【0030】

尚、凹凸部1個につき、フィルム層と吸音層との接着部の面積は $0.5 \sim 100 \text{ cm}^2$ 、空気層の面積は $1 \sim 100 \text{ cm}^2$ 、空気層の高さは $1 \sim 10 \text{ mm}$ が適している。

【手続補正4】

【補正対象書類名】明細書

【補正対象項目名】0037

【補正方法】変更

【補正の内容】

【0037】

ここで、発泡樹脂シート材としては、オレフィン系発泡シート、EPDM等が使用でき、面密度 $0.005 \sim 0.3 \text{ kg/m}^2$ 未満で、厚みは15 mm以下が良い。

【手続補正5】

【補正対象書類名】明細書

【補正対象項目名】0050

【補正方法】変更

【補正の内容】

【0050】

すなわち、インシュレータダッシュ20は、繊維集合体からなる吸音層21単層構成とした。この吸音層21は、その材質として、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、熱可塑性樹脂、あるいは熱硬化性樹脂をバインダとしてダッシュパネル10の面形状に沿って成形され、吸音層21の厚みは5～150mmで、その面密度は 3.0 kg/m^2 以下に設定され、吸音層21の周波数域630～4000Hzの平均吸音率が厚み20mm時で30～90%に調整された材料を使用する。

【手続補正6】

【補正対象書類名】明細書

【補正対象項目名】0059

【補正方法】変更

【補正の内容】

【0059】

上記インシュレータダッシュ20の防音特性を図3のグラフで示すように、吸音層21単層によるインシュレータダッシュ20の吸音・遮音性能（a）は、インストルメントパネル40の遮音性能（b）、吸音層21による吸音・遮音性能（c）、インストルメントパネル40内の吸音性能（d）の総和であり、特に、中音域、高音域における周波数域レベルの騒音を有効に減衰できることがグラフから明かである。

【手続補正7】

【補正対象書類名】明細書

【補正対象項目名】0065

【補正方法】変更

【補正の内容】

【0065】

そして、吸音層21と表皮層22とからなるインシュレータダッシュ20の平均吸音率は、15～95%になるように材料設定を行ない、その際、垂直入射吸音率630～4000Hz平均とする。また、表皮層22の厚みは、15mm以下で、かつインシュレータダッシュ20の厚みは5～150mmの間に設定する。

【手続補正8】

【補正対象書類名】明細書

【補正対象項目名】0066

【補正方法】変更

【補正の内容】

【0066】

更に、吸音層21と吸音層22の成形工法としては、カードリングによりコンベア状に繊維素を散布してマット状に集積して、吸音層21の原反マットを作製した後、表皮層22の接合面にホットメルトパウダーを付着させて加熱処理を行ない、ホットメルトを熔融した状態で予めマット状に形成された表皮層22を積層してコールドプレス成形により一体化すれば良い。

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(71)出願人 000124454

河西工業株式会社

神奈川県高座郡寒川町宮山3316番地

(72)発明者 古田 顕史

神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内

(72)発明者 関野 智博

神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内

(74)代理人 100069431

弁理士 和田 成則

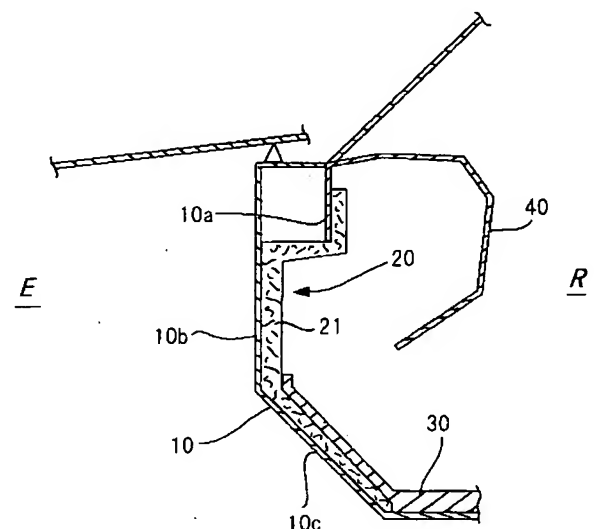
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(54)【発明の名称】 自動車用インシュレータ

(57)【要約】

【課題】 車体パネルの室内面に装着される自動車用インシュレータであって、防音特性を低下させることなく軽量化を図り、燃費効率、取付作業性を高める。

【解決手段】 ダッシュパネル10の室内面に装着されるインシュレータダッシュ20は、繊維集合体からなる吸音層21単層構成とすることにより、インシュレータダッシュ20の吸音、遮音性能に加えて、インストルメントパネル40内面から反射する反射騒音を再度表面側から吸音層21に取り込んで吸音することにより、インストルメントパネル40内の吸音性能を高める。よって、従来の遮音層を廃止することにより、軽量化が図れるとともに、インストルメントパネル40内の音圧上昇を抑え車室内の静粛性を高める。



10 ダッシュパネル

10a ダッシュアッパー部

10b ダッシュロア部

10c トーボード部

20 自動車用インシュレータダッシュ

21 吸音層

22、23、27 表皮層

24 接着部

25 空気層

26 フィルム層

30 フロアカーペット

40 インストルメントパネル

41 インストアンダーカバー

50 成形金型

51 成形上型

52 成形下型

【特許請求の範囲】

【請求項1】 車体パネル（10）の室内面側に添装される自動車用インシュレータ（20）であって、このインシュレータ（20）は、繊維成形体をベースとした吸音層（21）単層から構成され、車体パネル（10）を通じて吸音層（21）内に侵入する騒音を吸音するとともに、吸音層（21）を透過した透過騒音が車室内のパネル（40）内面で反射して、再度表面側から吸音層（21）内に再帰し、該反射騒音を吸音できる通気型インシュレータとして構成されていることを特徴とする自動車用インシュレータ。

【請求項2】 吸音層（21）の表裏面のうち少なくとも一方面に、吸音層（21）の面密度より高密度に設定された高密度繊維集合体からなる表皮層（22）が積層されていることを特徴とする請求項1に記載の自動車用インシュレータ。

【請求項3】 吸音層（21）の表面に、不織布（23a）裏面にホットメルトフィルム（23b）をラミネートした表皮層（23）が積層されるとともに、表皮層（22）が凹凸状に成形されていることにより、表皮層（23）の凹部で吸音層（21）と接着するとともに、表皮層（23）の凸部で空気層（25）が形成されることを特徴とする請求項1に記載の自動車用インシュレータ。

【請求項4】 吸音層（21）にフィルム層（26）が貼付されていることを特徴とする請求項1に記載の自動車用インシュレータ。

【請求項5】 フィルム層（26）は、吸音層（21）の全周に亘り吸音層（21）を被包するように設けられていることを特徴とする請求項4に記載の自動車用インシュレータ。

【請求項6】 フィルム層（26）は、吸音層（21）の表裏面側にラミネート処理されていることを特徴とする請求項4に記載の自動車用インシュレータ。

【請求項7】 フィルム層（26）は、吸音層（21）の表面側にラミネート処理されていることを特徴とする請求項4に記載の自動車用インシュレータ。

【請求項8】 フィルム層（26）は、吸音層（21）の表裏面の一部にのみ設けられていることを特徴とする請求項4に記載の自動車用インシュレータ。

【請求項9】 フィルム層（26）と吸音層（21）との間に、空気層（25）を設けたことを特徴とする請求項4乃至8のいずれかに記載の自動車用インシュレータ。

【請求項10】 フィルム層（26）が凹凸状に成形されていることにより、フィルム層（26）の凹部で吸音層（21）と接着するとともに、フィルム層（26）の凸部で空気層（25）が形成されていることを特徴とする請求項9に記載の自動車用インシュレータ。

【請求項11】 吸音層（21）の表裏面のうち少なく

とも一方面の全面、あるいは一部に発泡樹脂シート材からなる表皮層（27）が積層されていることを特徴とする請求項1に記載の自動車用インシュレータ。

【請求項12】 車室内のパネル（40）の下側にアンダーカバー（41）を設け、車体パネル（10）から吸音層（21）を通して透過する透過騒音が上記パネル（40）内の閉空間内で音圧低下されるようにしたことを特徴とする請求項1乃至11のいずれかに記載の自動車用インシュレータ。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】この発明は、車体パネルの室内面に添装される自動車用インシュレータに係り、特に、重量の高む遮音層を廃止して、軽量化を図るとともに、優れた防音性能が得られる通気型の自動車用インシュレータに関する。

【0002】

【従来の技術】通常、図17に示すように、エンジンルームEと車室Rとを区画するダッシュパネル1の室内面側には、インシュレータダッシュ2が添装されており、このインシュレータダッシュ2は、図18に拡大して示すように、再生ゴムシート、再生塩ビシート等、高密度材料からなる遮音層3と、その裏面側に積層一体化される繊維集合体からなる吸音層4とから構成されており、インシュレータダッシュ2の下側表面には、フロアカーペット5がラップ状に敷設され、また、インシュレータダッシュ2の上部側はインストルメントパネル6内に位置している。

【0003】そして、従来の二層構造のインシュレータダッシュ2の防音メカニズムを図19を基に説明すると、エンジンルームE内でのエンジン類や補器類の騒音f1は、ダッシュパネル1で一部が遮音され、残る騒音は、ダッシュパネル1を透過して室内側に伝播し、f2で示す騒音がインシュレータダッシュ2内に侵入する。

【0004】そして、この騒音f2は、その一部が吸音層4で吸音されるとともに、遮音層3で遮音されるが、一部は透過騒音f3としてインストルメントパネル6内に侵入する。

【0005】更に、インストルメントパネル6内に侵入する透過騒音f3は、インストルメントパネル6の内面で反射して、この反射騒音f4が遮音層3で再度反射され、結果的に反射騒音f4、f5がインストルメントパネル6の空間内で反響音となり、この反響音が車室内の静粛性を阻害する大きな要因となっている。

【0006】そして、この従来の防音（遮音・吸音）メカニズムにおいては、インシュレータダッシュ2における遮音・吸音割合と、インストルメントパネル6内での吸音割合は比率的に約9：1の割合である。

【0007】

【発明が解決しようとする課題】このように、従来のイ

ンシュレータダッシュ2は、高密度材料を素材とした遮音層3と、繊維集合体からなる吸音層4との二層積層体から構成されているため、特に、遮音層3の重量が嵩むため、製品の軽量化に逆行し、燃費効率の低下やインシュレータダッシュ2の取付作業性を悪化させるという問題点が指摘されている。

【0008】更に、従来のインシュレータダッシュ2の防音メカニズムにおいては、インシュレータダッシュ2の主に二重壁遮音機能による遮音・吸音機能に対してインストルメントパネル6内での吸音機能が非常に小さいため、インストルメントパネル6内での減衰されなかった透過音の解消が防音上急務とされていた。

【0009】この発明は、このような事情に鑑みてなされたもので、車体パネルの室内面に添装される自動車用インシュレータであって、特に、重量が嵩む遮音層を廃止して軽量化を促進させるとともに、吸音性能を高めることを可能にした自動車用インシュレータを提供することを目的としている。

【0010】

【課題を解決するための手段】上記目的を達成するために、本願の請求項1に記載の発明は、車体パネルの室内面側に添装される自動車用インシュレータであって、このインシュレータは、繊維成形体をベースとした吸音層単層から構成され、車体パネルを通じて吸音層内に侵入する騒音を吸音するとともに、吸音層を透過した透過騒音が車室内のパネル内面で反射して、再度表面側から吸音層内に再帰し、該反射騒音を吸音できる通気型インシュレータとして構成されていることを特徴とする。

【0011】ここで、吸音層の材質は、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、面密度 3.0 kg/m^2 以下であり、周波数域 $630\sim 4000\text{ Hz}$ の平均吸音率が厚み 20 mm 時で $30\sim 90\%$ に調整された材料を使用する。

【0012】そして、請求項1に記載の発明によれば、インシュレータは、吸音層単層から構成されているため、従来の重量の嵩む遮音層を廃止することができ、インシュレータの大幅な軽量化が可能となる。

【0013】更に、非通気性の遮音層を廃止したため、車体パネルから室内側に伝播する騒音は、吸音層を通じて車室内に透過し、その後、室内パネルの内面で反射する反射騒音は、再度吸音層表面側から吸音されることになり、車室内の音圧上昇を抑えることができる。

【0014】次いで、本願の請求項2に記載の発明は、吸音層の表裏面のうち少なくとも一方面に、吸音層の面密度より高密度に設定された高密度繊維集合体からなる表皮層が積層されていることを特徴とする。

【0015】ここで、表皮層の材質は、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、面密度 $0.005\sim 0.3$

kg/m^2 未満で、表皮層の厚みは 15 mm であり、表皮層は吸音層より高密度に設定されている。

【0016】また、表皮層は、車両の音振特性等により、全面、あるいは部分的に設けても良く、吸音層の表面側、あるいは裏面側のどちらか一方、あるいは両面に設定することも可能であり、吸音層と表皮層からなるインシュレータダッシュの周波数域 $630\sim 4000\text{ Hz}$ の平均吸音率が厚み 20 mm 時で $30\sim 90\%$ に調整された材料を使用する。

【0017】尚、インシュレータダッシュ全体の厚みは、 $5\sim 150\text{ mm}$ の範囲とする。

【0018】そして、請求項2に記載の発明によれば、吸音層と表皮層の双方とも繊維集合体から構成するというものであり、従来の重量の嵩む遮音層を廃止したため、製品の軽量化を可能にできるとともに、特に、吸音層の表面に高密度の繊維集合体からなる表皮層を設定することにより、車体パネルからの透過音の遮断を行ない、特に透過した車室内の騒音の吸音を効率良く行なうことができる。

【0019】更に、吸音層の表面側に高密度繊維集合体からなる吸音層を配置することにより、吸音層からのホコリ、繊維素の脱落を有効に防止できる。

【0020】本願の請求項3に記載の発明は、吸音層の表面に、不織布裏面にホットメルトフィルムをラミネートした表皮層が積層されるとともに、表皮層が凹凸状に成形されていることにより、表皮層の凹部で吸音層と接着しているとともに、表皮層の凸部で空気層が形成されることを特徴とする。

【0021】ここで、表皮層としての不織布は、ポリエステル繊維等を素材とし、目付量は $10\sim 100\text{ g/m}^2$ である。また、ホットメルトフィルムは、素材がポリオレフィン、ポリアミド、ポリエステル、エチレン酢酸ビニル共重合体等で、厚み $10\sim 100\text{ }\mu\text{m}$ のものを使用する。

【0022】更に、表皮層の成形手段としては、表皮層をインフラ加熱炉、吸音層を熱風加熱炉で加熱軟化処理した後、双方を重ねて、成形上下型内に投入し、成形下型から吸音層側にエアブローをかけて、冷却を行なうと同時に成形上型からバキューム力を作用させて表皮層に凹凸形状を成形する。

【0023】ここで、表皮層と吸音層との接着部の面積は $0.5\sim 100\text{ cm}^2$ で空気層の面積は $1\sim 100\text{ cm}^2$ 、空気層の高さは $1\sim 10\text{ mm}$ である。

【0024】そして、請求項3に記載の発明によれば、製品表面が凹凸状に成形されているため、シワ等が目立たず、空気層による緩衝性により表皮層が破れにくく、組付性が向上するとともに、収縮率の差が原因となる反り変形も防止できる。

【0025】更に、製品表面の凹凸により、車室内で騒音を乱反射させることができるとともに、製品表面積が

増加しているため吸音率が向上する。

【0026】本願の請求項4乃至10に記載の発明は、吸音層に積層する表皮層としてフィルム層が使用されていることを特徴とする。

【0027】ここで、フィルム層の材質は、ポリオレフィン系樹脂、ポリウレタン系樹脂、PET樹脂、紙等、又はそれらの複合体から構成して良く、フィルム層の厚みは10～200 μ mが好ましく、通気性の有無は問わない。

【0028】更に、フィルム層の配置構成としては、吸音層の全周に亘り設けても良く、また、吸音層の表面側、裏面側のいずれか一方、あるいは両面に設けることも可能である。更に、フィルム層の一部に開口を設け、吸音層を部分的にラミネートしても良く、あるいは、吸音層とフィルム層との間に空気層を介在させるようにしても良い。

【0029】また、フィルム層と吸音材層との間に空気層を設ける構成として、成形上下型で吸音層とフィルム層を一体化するとともに、成形上型からフィルム層にバキューム力を作用させて、フィルム層に凹凸部を形成し、凹部でフィルム層と吸音層を接着させ、凸部で空気層を形成するようにしても良い。その場合、フィルム層としては、ナイロン（ポリアミド樹脂）フィルムの裏面にホットメルトフィルムをラミネートしておけば、良好な耐熱性、成形性が確保できる。

【0030】尚、フィルム層と吸音層との接着部の面積は0.5～100 cm^2 、空気層の面積は1～100 cm^2 、空気層の高さは1～100 cm^2 が適している。

【0031】そして、請求項4乃至10に記載の発明によれば、吸音層の表裏面の少なくとも一方面にフィルム層をラミネート処理するというものであるから、従来の重量の嵩む遮音層を廃止でき、軽量化に貢献できる。

【0032】また、車室内のパネル内面で反射する反射騒音が吸音層内部で吸音できるため、車室内の音圧上昇を防止し、車室内の吸音性能を高めることができる。

【0033】更に、吸音層の表面側にフィルム層を貼付する構成を採用すれば、吸音層の繊維素等のホコリが室内に散乱することを防止できる。

【0034】また、フィルム層を凹凸状に成形することにより、フィルム層と吸音層との間に空気層を形成する構成を採用すれば、空気層の緩衝性により、フィルム層の破れがなく、また、シワ等の発生が目立たない。

【0035】更に、空気層部分では、フィルム層が吸音層から浮いているため、膜共振が発生し、吸音率が向上するとともに、車体パネル側からの透過騒音に対し、空気層が背後空気層の役割をにない、吸音率が向上する。

【0036】次に、本願の請求項11に記載の発明は、吸音層の表裏面のうち少なくとも一方面の全面、あるいは一部に発泡樹脂シート材からなる表皮層が積層されていることを特徴とする。

【0037】ここで、発泡樹脂シート材としては、オレフィン系発泡シート、EPPM等が使用でき、面密度0.005～0.3 kg/m^2 未満で、厚みは15mm以下が良い。

【0038】そして、請求項11に記載の発明によれば、インシュレータの製品重量を軽量化できるため、作業性、燃費効率を向上させることができる。

【0039】更に、表皮層として、独立発泡構造の発泡樹脂シートを使用した場合には、車体パネルを透過する透過騒音の遮断と、インシュレータを透過した車室内の吸音とで室内騒音を軽減できる。

【0040】また、表皮層として、連続発泡構造の発泡樹脂シートに使用した場合には、車体パネルを透過する透過騒音の遮断に比べ、インシュレータを透過した車室内での吸音効果が期待できる。

【0041】次いで、本願の請求項12に記載の発明は、車室内のパネルの下側にアンダーカバーを設け、車体パネルから吸音層を通して透過する透過騒音が上記パネル内の閉空間内で音圧低下されるようにしたことを特徴とする。

【0042】そして、請求項12に記載の発明によれば、車室内のパネル下側にアンダーカバーを付設することにより、車室内のパネルの内部空間を閉空間にできるため、車体パネルを通じて吸音層を透過する騒音は、室内側に音洩れすることがなく、車室内で音圧減衰することにより、車室内の吸音性能をより高めることができる。

【0043】

【発明の実施の形態】以下、本発明に係る自動車用インシュレータの実施形態について、添付図面を参照しながら詳細に説明する。

【0044】図1乃至図4は本発明の第1実施形態を示すもので、図1は自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図、図2は同インシュレータダッシュの吸音メカニズムを示す説明図、図3は同インシュレータダッシュの防音性能を示すグラフ、図4は同インシュレータダッシュの変形例を示す全体図である。また、図5乃至図7は本発明の第2実施形態を示すもので、図5はインシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図、図6は同インシュレータダッシュの防音性能を示すグラフ、図7は同インシュレータダッシュの変形例を示す説明図である。

【0045】更に、図8乃至図10は本発明の第3実施形態を示すもので、図8はインシュレータダッシュパネルをダッシュパネルに取り付けた状態を示す断面図、図9は同インシュレータダッシュの要部を示す部分断面図、図10は同インシュレータダッシュの成形工程の概要を示す説明図である。

【0046】また、図11乃至図15は本発明の第4実

施形態を示すもので、図 11 はインシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図、図 12 は同インシュレータダッシュにおけるフィルム層のバリエーションを示す説明図、図 13 は同インシュレータダッシュにおける防音性能を示すグラフ、図 14、図 15 は同インシュレータダッシュの変形例を示す各説明図、図 16 は本発明の第 5 実施形態を示すもので、自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【0047】まず、図 1 乃至図 4 に基づいて、本発明の第 1 実施形態について説明する。

【0048】図 1 において、エンジンルーム E と車室 R とを区画するダッシュパネル 10 は、上部側からダッシュアップパー部 10a、ダッシュロア部 10b、トーボード部 10c に区画され、ダッシュパネル 10 の室内面に沿ってインシュレータダッシュ 20 が添装されており、トーボード部 10c 上に装着されるインシュレータダッシュ 20 の表面側には、フロアカーペット 30 がラップ状に敷設され、更に、ダッシュパネル 10 のダッシュアップパー部 10a 及びダッシュロア部 10b の上半部分に装着されるインシュレータダッシュ 20 の上半部分は、インストルメントパネル 40 内に位置している。尚、インストルメントパネル 40 には、図示しないクラッシュパッドが装着されている。

【0049】ところで、本発明に係るインシュレータダッシュ 20 は、燃費効率及び取付作業性を高めるために、製品重量を大幅に軽量化するとともに、軽量化しても十分な防音特性を備えるように構成されている。

【0050】すなわち、インシュレータダッシュ 20 は、繊維集合体からなる吸音層 21 単層構成とした。この吸音層 21 は、その材質として、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、熱可塑性樹脂、あるいは熱硬化性樹脂をバインダとしてダッシュパネル 10 の面形状に沿って成形され、吸音層 21 の厚みは 5～150mm で、その面密度は 3.0 kg/m^2 に設定され、吸音層 21 の周波数域 630～4000Hz の平均吸音率が厚み 20mm 時で 30～90% に調整された材料を使用する。

【0051】本実施形態においては、再生 PET 繊維に低融点 PET 樹脂をバインダとして混入し、コンベアベルト上でマット状に集積したものを加熱処理後、プレス加工により所望のマット状に成形され、この原反マットを加熱軟化させた後、所望の金型形状をもつコールドプレス成形金型によりダッシュパネル 10 の面形状に沿った所望の形状に成形される。

【0052】尚、バインダとして熱硬化性樹脂を含浸させたものでは、ホットプレス成形を使用して所要形状に成形される。

【0053】以上説明したように、本発明においては、

バインダとして熱可塑性樹脂でも熱硬化性樹脂でも良く、吸音特性に優れた繊維集合体から構成されれば、材質や成形工法は特に限定するものではない。

【0054】このように、本発明に係る自動車用インシュレータダッシュ 20 は、吸音層 21 単層構成から構成されているため、従来の重量の嵩むゴムシート、あるいは塩ビシート等の遮音層を廃止できるため、製品重量を大幅に軽減でき、この軽量化により燃費効率を高めることができるとともに、インシュレータダッシュ 20 をダッシュパネル 10 に取り付ける作業性も優れたものとなる。

【0055】更に、本発明に係るインシュレータダッシュ 10 は、吸音層 21 単層構成としたため、図 2 に示す吸音メカニズムを発揮する。

【0056】すなわち、エンジンルーム E で発生する騒音（図中 F1）は、ダッシュパネル 10 で一部が遮音され、残りが騒音（図中 F2）として吸音層 21 内に侵入する。

【0057】そして、吸音層 21 の吸音機能により上記 F2 で示す騒音の一部が吸音された結果、残る透過騒音（図中 F3）がインストルメントパネル 40 内に侵入し、インストルメントパネル 40 の内面に反射されてこの反射騒音（図中 F4）が再度吸音層 21 内に透過する再帰透過騒音（図中 F5）となり、吸音層 21 の吸音機能により吸音される。

【0058】このように、吸音層 21 単層構成を採用することにより、ダッシュパネル 10 を通じて室内側に伝播する騒音を一部吸音するとともに、吸音層 21 を透過して車室内に透過する透過騒音は、インストルメントパネル 40 に反射して、この反射騒音を再度吸音層 21 により減衰することにより、インストルメントパネル 40 内の減衰されなかった透過音を有効に防止できる。

【0059】上記インシュレータダッシュ 20 の防音特性を図 3 のグラフで示すように、吸音層 21 単層によるインシュレータダッシュ 20 の吸音・遮音性能（a）は、インストルメントパネル 40 の遮音性能（b）、吸音層 21 による吸音・遮音性能（c）、インストルメントパネル 40 内の吸音性能（d）の相和であり、特に、中音域、高音域における周波数域レベルの騒音を有効に減衰できることがグラフから明かである。

【0060】次いで、図 4 は上記インシュレータダッシュ 20 の変形例を示すもので、インストルメントパネル 40 内の吸音性を高めるために、インストルメントパネル 40 の下側にインストアンダーカバー 41 を設置して、インストルメントパネル 40 内を閉空間としたことが特徴であり、このことにより、インストルメントパネル 40 内の吸音性能をより高めることができ、更に防音特性の向上が期待できる。

【0061】次いで、図 5 乃至図 7 は本発明の第 2 実施形態を示すもので、この第 2 実施形態におけるインシュ

レータダッシュ20は、吸音層21の表面側に繊維集合体からなる表皮層22が一体化されている。

【0062】吸音層21は、第1実施形態と同一構成のものを使用すれば良く、表皮層22は、吸音層21よりも高密度に設定されていることが特徴である。

【0063】表皮層22の材質は、フェルト、PET（ポリエステル）繊維、紙類（パルプ等）等を繊維状にした繊維集合体からなり、面密度は $0.005 \sim 0.3 \text{ kg/m}^2$ 未満で、この表皮層22は、エンジンルームEからダッシュパネル10を通じて吸音層21内に侵入する騒音に対して、一部を遮断し、また、一部を吸音する。そして、表皮層22を透過した透過騒音は、インストルメントパネル40の内面で反射され、再度表皮層22を通じて吸音層21内に侵入し吸音されるため、インストルメントパネル40内にこもり音が生じることを確実に防止できる。

【0064】また、この実施形態においては、吸音層21の表面側に表皮層22を配置したが、車両の音振特性により、表皮層22は、ダッシュパネル10側、すなわち、吸音層21の裏面に一体化しても良く、また、部分的に表皮層22を吸音層21の一部にラミネートして、残る部分を吸音層21単層としても良い。

【0065】そして、吸音層21と表皮層22とからなるインシュレータダッシュ20の平均吸音率は、 $15 \sim 95\%$ になるように材料設定を行ない、その際、垂直入射吸音率 $630 \sim 4000 \text{ Hz}$ 平均とする。また、表皮層22の厚みは、 1.5 mm で、かつインシュレータダッシュ20の厚みは $5 \sim 150 \text{ mm}$ の間に設定する。

【0066】更に、吸音層21と吸音層22の成形工法としては、カードリングによりコンベア状に繊維素を散布してマット状に集積して、吸音層21の原反マットを作成した後、表皮層22の接合面にホットメルトパウダーを付着させて加熱処理を行ない、ホットメルトを溶融した状態で予めマット状に形成された表皮層22を積層してコールドプレス成形により一体化すれば良い。

【0067】そして、この第2実施形態におけるインシュレータダッシュ20の防音性能を図6のグラフで示すように、インシュレータダッシュ20の防音性能(a)は、インストルメントパネル40の遮音性(b)、インシュレータダッシュ20の吸音性、遮音性(c)、インストルメントパネル40内の吸音性能(d)の三者を相和したもので、 $630 \sim 4000 \text{ Hz}$ における良好な防音性能が得られることがわかる。

【0068】尚、この測定に使用したインシュレータダッシュの組成としては、吸音層21としてPET繊維 2.0 kg/m^2 、表皮層22としてPET繊維 1.2 kg/m^2 のものを使用した。

【0069】このように、第2実施形態におけるインシュレータダッシュ20においても、従来の重量の嵩む遮音層を廃止できるため、軽量化が可能となり、燃費効率

を高め、取付作業性も良好なものになるという第1実施形態と同様の作用効果を備えるとともに、上述した図6のグラフに示すように、優れた防音性能が得られる。

【0070】更に、図7に示すように、第2実施形態においても、インストルメントパネル40の下側にインストアンダーカバー41を付設することにより、インストルメントパネル40内を閉空間として、インストルメントパネル40内の吸音性能を高めることができる。

【0071】図8乃至図10は、本発明の第3実施形態を示すもので、上述した第1、第2実施形態と同一部分には、同一符号を付し、詳細な説明は省略する。

【0072】図8に示すように、本実施形態におけるインシュレータダッシュ20は、吸音層21の表面側に積層される表皮層23として不織布23a裏面にホットメルトフィルム23bをラミネートした積層体を使用されている。

【0073】上記不織布23aは、ポリエステル繊維を素材とし、目付量が $10 \sim 100 \text{ g/m}^2$ に設定され、ホットメルトフィルム23bは接着媒体として機能するもので、厚み $10 \sim 100 \mu\text{m}$ のものが使用されている。

【0074】更に、吸音層21と表皮層23との関係は、図9に示すように、表皮層23が凹凸状に成形されており、表皮層23の凹部が複数箇所に形成され、吸音層21と表皮層23との接着部24として設定され、この接着部24の面積 $S1$ は $0.5 \sim 100 \text{ cm}^2$ である。

【0075】また、表皮層23の凸部は空気層25に相当し、この空気層25の面積 $S2$ は $1 \sim 100 \text{ cm}^2$ であり、空気層25の高さ h は $1 \sim 10 \text{ mm}$ である。

【0076】そして、図示するように、製品表面が凹凸状に成形され、凸部に相当して吸音層21と表皮層23との間の空気層25が形成されているため、この空気層25の緩衝作用により表皮層23が破れにくくなり、車体パネルへの組付作業性が向上する。

【0077】更に、吸音層21と表皮層23との間の収縮率の差による反りが抑えられ、パネルへのフィット性も向上する。

【0078】また、製品表面は凹凸上であるため、シワ等が目立たず、外観性能を高めることができるとともに、室内側からの騒音に対して表皮層23の表面積が増加しているため、吸音性能が向上する。

【0079】次に、図8、図9に示すインシュレータダッシュ20の成形方法について、図10を基に説明すると、成形金型50は、成形上型51と成形下型52とからなり、成形上型51の型面には無数の真空吸引孔51aが開設され、図示しない真空吸引機構が付設されるとともに、成形上型51の型面は製品凹凸に対応する凹凸面53に設定されている。一方、成形下型52の型面にはブロー孔52aが無数に開設され、図示しないエ

アブロー機構が付設されている。

【0080】そして、成形金型50が型開き状態にあるとき、表皮層23をインフラ加熱炉、吸音層21を熱風加熱炉で加熱軟化処理した後、成形金型50内に投入し、成形上下型51、52を型締めするとともに、成形上型51から表皮層23を真空吸引し、かつ成形下型52から吸音層21内にエアーを供給することにより、吸音層21から表皮層23を浮かせた空気層25を設けたインシュレータダッシュ20を成形することができる。

【0081】図11乃至図15は、本発明の第4実施形態を示すもので、図11に示すように、本実施形態におけるインシュレータダッシュ20は、吸音層21の表面側にフィルム層26が一体化されている。

【0082】従って、本実施形態においても従来の重量の嵩むゴムシート、塩ビシート等の遮音層を廃止することにより、軽量化が可能となり、取付作業性を向上させることができるとともに、前述実施形態同様、吸音層21及びフィルム層26を透過して、インストルメントパネル40内に侵入する透過騒音は、インストルメントパネル40内面で反射されて、フィルム層26及び吸音層21内に再度侵入して吸音処理されるため、インストルメントパネル40内の音圧上昇を防止し、騒音が反響することがなく、車室内の静粛性を向上させるという同一の作用効果を備えており、構造上、フィルム層26を吸音層21に一体化するため、構造が簡素で製作も容易である。

【0083】このフィルム層26と吸音層21との一体化は、車両の音振特性や吸音層21の吸音特性により、図12に示す各種バリエーションが考えられる。

【0084】図12(a)は、吸音層21の表面側にフィルム層26を一体化したもので、図12(b)は、吸音層21の全周に亘りフィルム層26により包囲した構成であり、図12(c)は、吸音層21の表面及び裏面の両面にフィルム層26を一部空気層25を介在して配置した構成で、図12(d)は、吸音層21の表面にフィルム層26を一体化するが、フィルム層26に一部開口26aを設け、吸音層21を部分的にフィルム層26で被覆した構成である。

【0085】上記吸音層21にフィルム層26を一体化する工法として、第1実施形態、第2実施形態に使用した吸音層21を使用する場合には、この吸音層21の原反マットにホットメルト系パウダーをコーティング処理した後、加熱軟化処理後、フィルム層26を重ね合わせて一体化すれば良い。

【0086】尚、上記フィルム層26としては、その材質はポリオレフィン系樹脂フィルム、ポリウレタン系樹脂フィルム、ポリエステル系樹脂フィルム、紙等、又はそれらの複合体を使用することもでき、フィルム層26の厚みは、10 μ m～200 μ mのものを使用する。また、フィルム層26は、通気性の有無を問わず、このフ

ィルム層26は、吸音層21の繊維くず等が外部に脱落するのを防止する効果もある。

【0087】そして、フィルム層26としては、特に通気性を備えたフィルム層26を使用した場合には、エンジンルームEからの透過音の一部を遮断でき、更に透過したインストルメントパネル40内の透過騒音を再度吸音層21内に取り込んで反射騒音の吸音を行なうことが可能である。

【0088】図13で第4実施形態におけるインシュレータダッシュ20の防音特性をグラフで示す。

【0089】そして、この第4実施形態においても、インシュレータダッシュ20のトータルの防音特性(a)は、インストルメントパネル40の遮音性(b)、インシュレータの吸音性、遮音性(c)、インストルメントパネル40内の吸音性(d)の相和であり、図13のグラフで示すように、630～4000Hzにおける良好な吸音性が期待できる。

【0090】更に、第4実施形態においても、図14に示すように、インストルメントパネル40の下側にインストアンダーカバー41を設けることにより、インストルメントパネル40内を閉空間として、インストルメントパネル40内の吸音性を高めることができる。

【0091】更に、図15に示すように、吸音層21からフィルム層26を一部浮かせて空気層25を設けるようにしても良く、その場合はフィルム層26としては、耐熱性、成形性を考慮して、ナイロン(ポリアミド)樹脂フィルム裏面に接着層としてホットメルトフィルムをラミネートした材料が適している。

【0092】尚、成形方法は、図10に示した成形金型50を使用すれば良く、接着部24や空気層25の構成も第3実施形態の表皮層23のときと同様である。

【0093】最後に、図16に沿って、本発明の第5実施形態について説明する。この実施形態では、表皮層27として発泡樹脂シート材料が使用されている。例えば、オレフィン系発泡樹脂、EPDM等の発泡フォーム材で、面密度0.005～0.3kg/m²未満のもので、厚みは15mm以下のものが適している。

【0094】そして、この実施形態においても、表皮層27として発泡樹脂シート材料を使用する構成であるため、インシュレータダッシュ20を軽量化でき、作業性、燃費効率を向上させることができる。

【0095】また、表皮層27として、独立発泡構造のフォーム材を使用した場合、エンジンルームEからの透過音の遮断とインシュレータダッシュ20を透過したインスト40内の音の吸音とで室内の騒音を軽減できる。

【0096】一方、表皮層27として、連続発泡構造のフォーム材を使用した場合、エンジンルームEからの透過音の遮断に比べインシュレータダッシュ20を透過したインスト40内の音の吸音を重視させることができる。

【0097】以上、自動車用インシュレータダッシュ20の実施形態について説明したが、車体パネルに装着される自動車用インシュレータ全般に適用できる。

【0098】

【発明の効果】以上説明した通り、本発明に係る自動車用インシュレータは、繊維集合体からなる吸音層単層構成か、あるいは吸音層の少なくとも一方面側に高密度繊維集合体からなる表皮層、又はフィルム層を積層するという構成であり、従来の重量の嵩むゴムシート、塩ビシート等の遮音層を廃止する構成であるため、インシュレータの軽量化を大幅に促進させることができ、燃費効率を高めるとともに、インシュレータの取付作業性を良好なものにできるという作用効果を有する。

【0099】更に、本発明に係るインシュレータは、通気型構成であるため、車体パネルを通じて室内側に伝播してくる騒音の一部を吸音層で吸音する一方、室内側に透過する透過騒音は、車室内のパネルで反射されて再度吸音層に戻りその一部が吸音されるため、車室内での音圧上昇を防止でき、車室内の防音特性を大幅に向上させることができるという効果を有する。

【0100】また、吸音層に高密度繊維集合体からなる表皮層やフィルム層をラミネートする構成では、表皮層やフィルム層がプロテクタ機能をもつため、吸音層の繊維素が外部に脱落することを防止でき、車室内のクリーンな環境を確保できるという効果もある。

【0101】加えて、吸音層の表面に不織布、あるいはフィルム層等の表皮層を貼着する場合、吸音層から表皮層を一部浮かせた状態で積層一体化すれば、空気層の緩衝作用により、表皮層の破れがなく、かつ車体パネルへのフィット性も向上するとともに、製品表面が凹凸状となるため、騒音が車室内で乱反射し、吸音効率を高めることができるという効果を有する。

【図面の簡単な説明】

【図1】本発明の第1実施形態を示すもので、自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【図2】図1に示す自動車用インシュレータダッシュの吸音メカニズムを示す説明図である。

【図3】図1に示す自動車用インシュレータダッシュにおける防音特性を示すグラフである。

【図4】図1に示すインシュレータダッシュの変形例を示す説明図である。

【図5】本発明の第2実施形態を示すもので、自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【図6】図5に示すインシュレータダッシュの取付構造における防音特性を示すグラフである。

【図7】図5に示す自動車用インシュレータダッシュの変形例を示す説明図である。

【図8】本発明の第3実施形態を示すもので、自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【図9】図8に示す自動車用インシュレータダッシュの要部を示す断面図である。

【図10】図8に示す自動車用インシュレータダッシュの成形金型を示す説明図である。

【図11】本発明の第4実施形態における自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【図12】図11に示す自動車用インシュレータダッシュにおけるフィルム層のバリエーションを示す各説明図である。

【図13】図11に示す自動車用インシュレータダッシュにおける防音特性を示すグラフである。

【図14】図11に示す自動車用インシュレータダッシュの変形例を示す説明図である。

【図15】図11に示す自動車用インシュレータダッシュの変形例を示す説明図である。

【図16】本発明の第5実施形態における自動車用インシュレータダッシュをダッシュパネルに取り付けた状態を示す断面図である。

【図17】従来のインシュレータダッシュの配置構成を示す説明図である。

【図18】従来のインシュレータダッシュの構成を示す断面図である。

【図19】従来のインシュレータダッシュにおける防音メカニズムを示す説明図である。

【符号の説明】

10 ダッシュパネル

10a ダッシュアップ部

10b ダッシュロア部

10c トーボード部

20 自動車用インシュレータダッシュ

21 吸音層

22, 23, 27 表皮層

24 接着部

25 空気層

26 フィルム層

30 フロアカーペット

40 インストルメントパネル

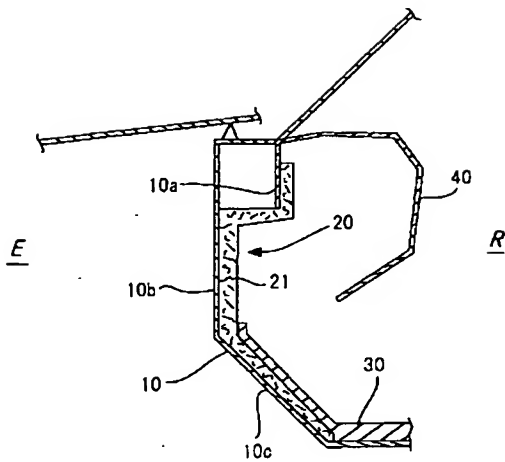
41 インストアンダーカバー

50 成形金型

51 成形上型

52 成形下型

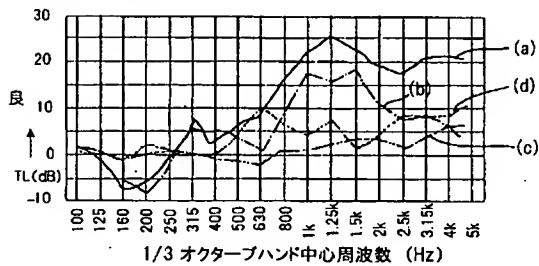
【図1】



- | | |
|--------------------|----------------|
| 10 ダッシュパネル | 25 空気層 |
| 10a ダッシュアップ部 | 26 フィルム層 |
| 10b ダッシュロア部 | 30 フロアカーペット |
| 10c トーボード部 | 40 インストルメントパネル |
| 20 自動車用インシュレータダッシュ | 41 インストアンダーカバー |
| 21 吸音層 | 50 成形金型 |
| 22, 23, 27 表皮層 | 51 成形上型 |
| 24 接着部 | 52 成形下型 |

【図3】

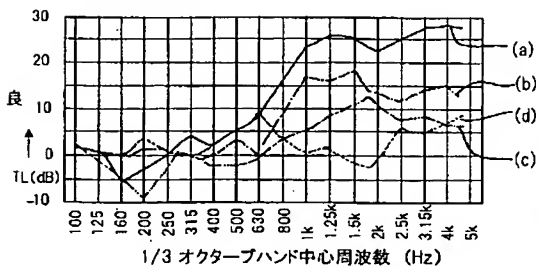
◇ 表皮レス仕様



— (2) インスト、インシュレータ吸音	(a)
- - - (3) インスト遮音	(b)
..... (4) インシュレータ吸音	(c)
- · - · (5) インスト内吸音	(d)

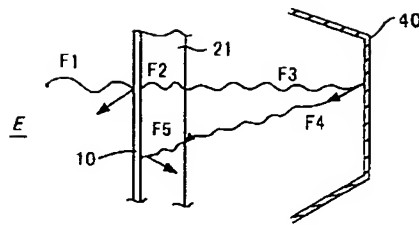
【図6】

◇ 通気型仕様

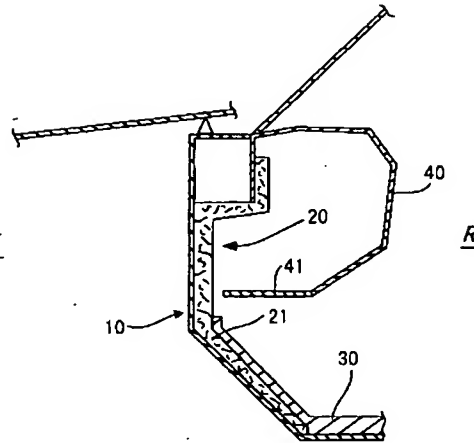


— (2) インスト、インシュレータ吸音	(a)
- - - (3) インスト遮音	(b)
..... (4) インシュレータ吸音	(c)
- · - · (5) インスト内吸音	(d)

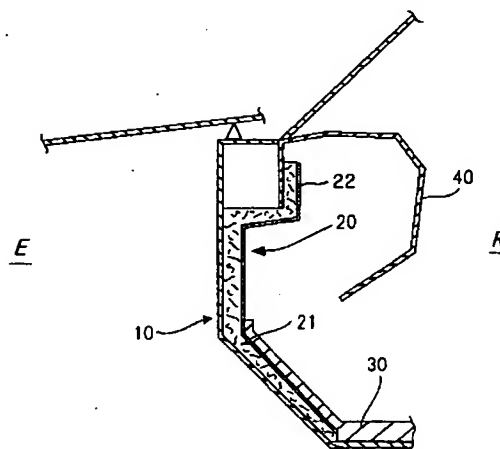
【図2】



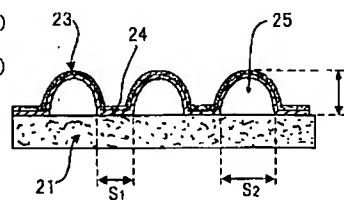
【図4】



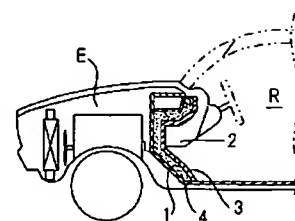
【図5】



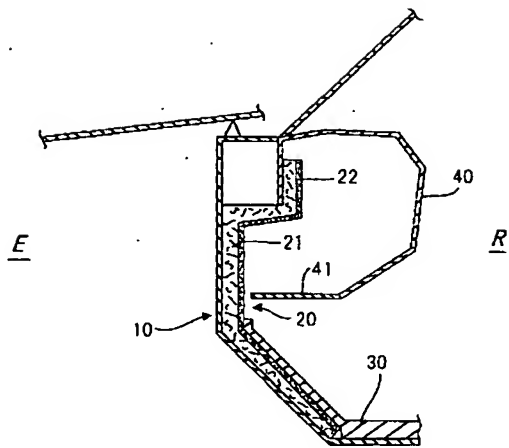
【図9】



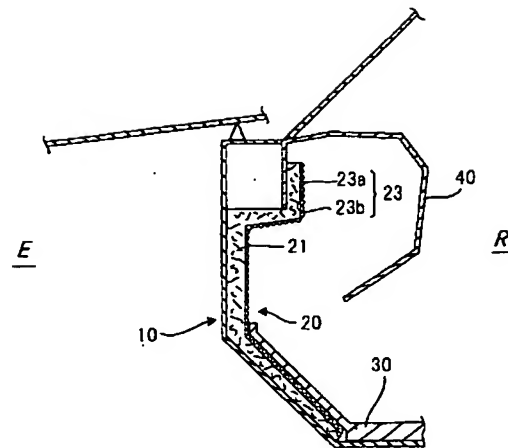
【図17】



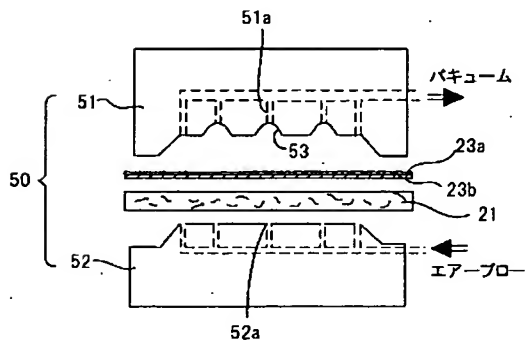
【図7】



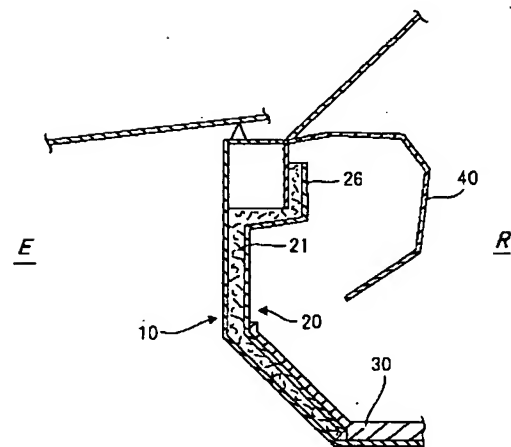
【図8】



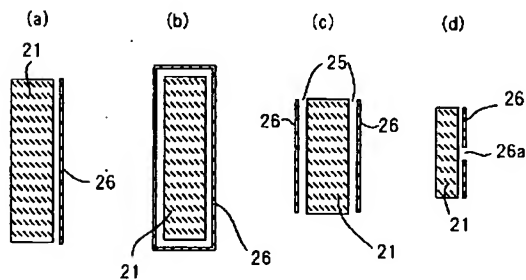
【図10】



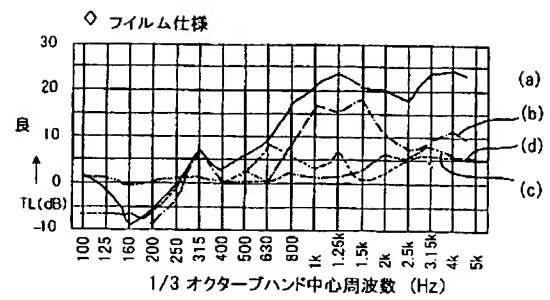
【図11】



【図12】

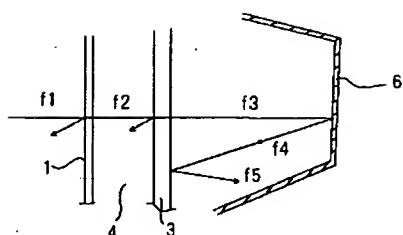


【図13】

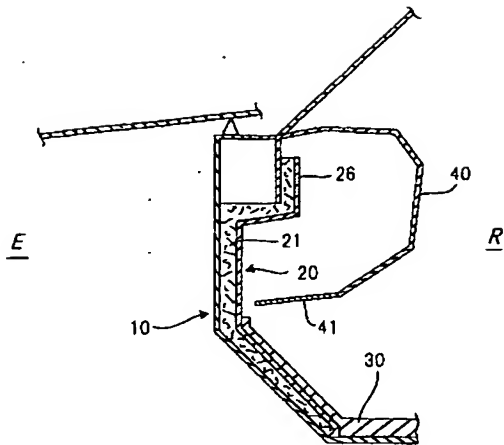


—	(2) インスト、インシュレータ吸遮音	(a)
- - -	(3) インスト遮音	(b)
...	(4) インシュレータ吸遮音	(c)
- · - · -	(5) インスト内吸音	(d)

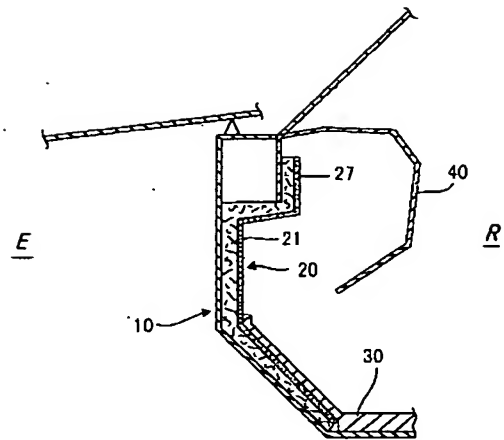
【図19】



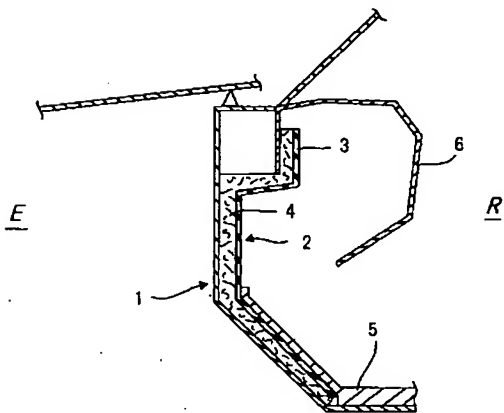
【図14】



【図16】



【図18】



フロントページの続き

(72)発明者 佐々木 邦明
神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内
(72)発明者 坂田 裕司
神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内

(72)発明者 藪下 省三
神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内
(72)発明者 立木 智博
神奈川県高座郡寒川町宮山3316番地 河西
工業株式会社内

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BE04 BE20 BE22

[Claim(s)]

[Claim 1] It is the insulator for automobiles (20) with which the indoor side side of a car-body panel (10) is decorated. This insulator (20) While absorbing sound the noise which consists of absorption-of-sound layer (21) monolayers which used the fiber Plastic solid as the base, and invades in an absorption-of-sound layer (21) through a car-body panel (10) The insulator for automobiles which the transparency noise which penetrated the absorption-of-sound layer (21) reflects by the panel (40) inside of the vehicle interior of a room, carries out recurrence into an absorption-of-sound layer (21) from a front-face side again, and is characterized by being constituted as an aeration mold insulator which can absorb sound this reflective noise. [Claim 2] The insulator for automobiles according to claim 1 characterized by carrying out the laminating of the epidermis layer (22) which becomes a field from the high density fiber aggregate set as high density from the surface density of an absorption-of-sound layer (21) on the other hand at least while on the rear face of front of an absorption-of-sound layer (21).

[Claim 3] While the laminating of the epidermis layer (23) which laminated the hot melt film (23b) at the nonwoven fabric (23a) rear face in the front face of an absorption-of-sound layer (21) is carried out The insulator for automobiles according to claim 1 characterized by forming an air space (25) by the heights of an epidermis layer (23) while pasting up with an absorption-of-sound layer (21) in the crevice of an epidermis layer (23), when the epidermis layer (22) is fabricated by concave convex.

[Claim 4] The insulator for automobiles according to claim 1 characterized by sticking the film layer (26) on the absorption-of-sound layer (21).

[Claim 5] A film layer (26) is an insulator for automobiles according to claim 4 characterized by being prepared so that the perimeter of an absorption-of-sound layer (21) may be covered and an absorption-of-sound layer (21) may be wrapped entirely.

[Claim 6] A film layer (26) is an insulator for automobiles according to claim 4 characterized by carrying out lamination processing at the front rear-face side of an absorption-of-sound layer (21).

[Claim 7] A film layer (26) is an insulator for automobiles according to claim 4 characterized by carrying out lamination processing at the front-face side of an absorption-of-sound layer (21).

[Claim 8] A film layer (26) is an insulator for automobiles according to claim 4 characterized by being prepared in a part of front rear face of an absorption-of-sound layer (21).

[Claim 9] The insulator for automobiles according to claim 4 to 8 characterized by preparing an air space (25) between a film layer (26) and an absorption-of-sound layer (21).

[Claim 10] The insulator for automobiles according to claim 9 characterized by forming the air space (25) by the heights of a film layer (26) while pasting up with an absorption-of-sound layer (21) in the crevice of a film layer (26), when the film layer (26) is fabricated by concave convex.

[Claim 11] The insulator for automobiles according to claim 1 characterized by

carrying out the laminating of the epidermis layer (27) which becomes the whole surface of a field, or a part from a foaming resin web material on the other hand at least while on the rear face of front of an absorption-of-sound layer (21).

[Claim 12] The insulator for automobiles according to claim 1 to 11 characterized by carrying out the sound pressure fall of the transparency noise which prepares undercover (41) in the panel (40) bottom of the vehicle interior of a room, and is penetrated through an absorption-of-sound layer (21) from a car-body panel (10) in a closed space in the above-mentioned panel (40).

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] It relates to the insulator for automobiles of the aeration mold with which the outstanding sound isolation engine performance is obtained while this invention relates to the insulator for automobiles with which the indoor side of a car-body panel is decorated, abolishes the noise insulation layer in which weight increases especially and attains lightweight-ization.

[0002]

[Description of the Prior Art] usually, as shown in drawing 17, to the indoor side side of the dash panel 1 which divides an engine room E and the vehicle room R The insulator dash 2 is attached decoratively. This insulator dash 2 The noise insulation layer 3 which consists of high density ingredients, such as a playback rubber sheet and a playback vinyl chloride sheet, so that it may expand to drawing 18 and may be shown, It consists of absorption-of-sound layers 4 which consist of the fiber aggregate by which laminating unification is carried out at the rear-face side, and the floor carpet 5 is laid by the bottom front face of the insulator dash 2 in the shape of a lap, and the upper part side of the insulator dash 2 is located in an instrument panel 6.

[0003] And if the sound isolation mechanism of the insulator dash 2 of the conventional two-layer structure is explained based on drawing 19, the noise with which the noise f1 of the engines in an engine room E and accessory vessels penetrates a dash panel 1, spreads it to an interior-of-a-room side, and indicates the noise which a part insulates with a dash panel 1 and remains to be by f2 will invade in the insulator dash 2.

[0004] And although this noise f2 insulates in the noise insulation layer 3 while that part absorbs sound in the absorption-of-sound layer 4, a part invades in an instrument panel 6 as transparency noise f3.

[0005] Furthermore, it reflects by the inside of an instrument panel 6, this reflective noise f4 is again reflected in the noise insulation layer 3, the reflective noise f4 and f5 turns into reverberation in the space of an instrument panel 6 as a result, and the transparency noise f3 which invades in an instrument panel 6 has become the big factor from which this reverberation prevents the silence of the vehicle interior of a room.

[0006] And in this conventional sound isolation (noise insulation and absorption of sound) mechanism, noise insulation / absorption-of-sound rate in the insulator dash 2 and the absorption-of-sound rate within an instrument panel 6 are about 9:1 rates in

ratio.

[0007]

[Problem(s) to be Solved by the Invention] Thus, since the conventional insulator dash 2 consists of bilayer layered products of the noise insulation layer 3 made from the high density ingredient, and the absorption-of-sound layer 4 which consists of the fiber aggregate and the weight of the noise insulation layer 3 increases especially, it moves against lightweight-ization of a product and the trouble of worsening the attachment workability of decline in fuel consumption effectiveness or the insulator dash 2 is pointed out.

[0008] Furthermore, in the sound isolation mechanism of the conventional insulator dash 2, to noise insulation / absorption-of-sound function by the double-wall noise insulation function, since the absorption-of-sound function within an instrument panel 6 was very small, the dissolution of the transmitted sound within an instrument panel 6 which was not decreased was made into sound isolation top pressing need at the Lord of the insulator dash 2.

[0009] It aims at offering the insulator for automobiles which made it possible to raise the absorption-of-sound engine performance while this invention was made in view of such a situation, abolishes the noise insulation layer in which it is the insulator for automobiles with which the indoor side of a car-body panel is decorated, and weight increases especially and promotes lightweight-ization.

[0010]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of this application according to claim 1 It is the insulator for automobiles with which the indoor side side of a car-body panel is decorated. This insulator While absorbing sound the noise which consists of absorption-of-sound layer monolayers which used the fiber Plastic solid as the base, and invades in an absorption-of-sound layer through a car-body panel The transparency noise which penetrated the absorption-of-sound layer reflects by the panel inside of the vehicle interior of a room, carries out recurrence into an absorption-of-sound layer from a front-face side again, and is characterized by being constituted as an aeration mold insulator which can absorb sound this reflective noise.

[0011] Here, the quality of the material of an absorption-of-sound layer consists of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), it is two or less surface density 3.0 kg/m, and the average sound absorption coefficient of 630-4000Hz of frequency regions uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0012] And according to invention according to claim 1, since it consists of absorption-of-sound layer monolayers, an insulator can abolish the noise insulation layer in which the conventional weight increases, and large lightweight-ization of an insulator of it is attained.

[0013] Furthermore, since the noise insulation layer of non-permeability was abolished, the noise spread from a car-body panel to an interior-of-a-room side is penetrated to the vehicle interior of a room through an absorption-of-sound layer, and after that, the reflective noise reflected by the inside of an indoor panel will absorb sound from an absorption-of-sound layer front-face side again, and can suppress the

sound build-up of the vehicle interior of a room.

[0014] Subsequently, invention of this application according to claim 2 is characterized by carrying out the laminating of the epidermis layer which becomes a field from the high density fiber aggregate set as high density from the surface density of an absorption-of-sound layer on the other hand at least while on the rear face of front of an absorption-of-sound layer.

[0015] Here, the quality of the material of an epidermis layer consists of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), by surface density 0.005 - less than two 0.3 kg/m, the thickness of an epidermis layer is 15mm and the epidermis layer is set as high density from the absorption-of-sound layer.

[0016] Moreover, with the **** property of a car etc., the epidermis layer is possible also for the whole surface or preparing partially and setting it as either the front-face side of an absorption-of-sound layer or a rear-face side and both sides, and the ingredient with which the average sound absorption coefficient of 630-4000Hz of frequency regions of an insulator dash which consist of an absorption-of-sound layer and an epidermis layer was adjusted to 30 - 90% in thickness the o'clock of 20mm is used for it.

[0017] In addition, let thickness of the whole insulator dash be the range of 5-150mm.

[0018] And since the noise insulation layer in which the both sides of an absorption-of-sound layer and an epidermis layer tell that they constitute from the fiber aggregate, and the conventional weight increases was abolished according to invention according to claim 2, while enabling lightweight-ization of a product By setting especially the epidermis layer which consists of the fiber aggregate of high density as the front face of an absorption-of-sound layer, the transmitted sound from a car-body panel can be intercepted, and the noise of the vehicle interior of a room penetrated especially can be absorbed sound efficiently.

[0019] Furthermore, omission of the dust from an absorption-of-sound layer and fibrin can be effectively prevented by arranging the absorption-of-sound layer which is from the high density fiber aggregate on the front-face side of an absorption-of-sound layer.

[0020] Invention of this application according to claim 3 is characterized by forming an air space in it by the heights of an epidermis layer, while having pasted the front face of an absorption-of-sound layer with the absorption-of-sound layer in the crevice of an epidermis layer, when the epidermis layer is fabricated by concave convex, while the laminating of the epidermis layer which laminated the hot melt film at the nonwoven fabric rear face is carried out.

[0021] Here, the nonwoven fabric as an epidermis layer is made from polyester fiber etc., and metsuke amount is 10-100g/m². Moreover, materials are polyolefine, a polyamide, polyester, an ethylene-vinyl acetate copolymer, etc., and a thing with a thickness of 10-100 micrometers is used for a hot melt film.

[0022] Furthermore, as a shaping means of an epidermis layer, after carrying out the epidermis layer with the infrastructure heating furnace and carrying out heating softening processing of the absorption-of-sound layer with a hot blast heating furnace, both sides are thrown in in a shaping vertical mold in piles, the vacuum force is made to act from a shaping punch, and the shape of toothing is fabricated in an epidermis

layer at the same time it cools by applying the Ayr blow to an absorption-of-sound layer side from shaping female mold.

[0023] Here, the area of jointing of an epidermis layer and an absorption-of-sound layer is [the height of 2 and an air space of the area of an air space] 1-10mm 1-100cm in 2 0.5-100cm.

[0024] And since the product front face is fabricated by concave convex, while according to invention according to claim 3 Siwa etc. is not conspicuous, an epidermis layer cannot be easily torn due to the buffer nature by the air space and assemblability improves, the curvature deformation from which the difference of contraction becomes a cause can also be prevented.

[0025] Furthermore, with the irregularity on the front face of a product, while being able to carry out scattered reflection of the noise in the vehicle interior of a room, since product surface area is increasing, an acoustic absorptivity improves.

[0026] Invention of this application according to claim 4 to 10 is characterized by using the film layer as an epidermis layer which carries out a laminating to an absorption-of-sound layer.

[0027] Here, the quality of the material of a film layer may constitute polyolefine system resin, polyurethane system resin, PET, paper, etc. from those complex, the thickness of a film layer has desirable 10-200 micrometers, and the existence of permeability does not ask.

[0028] Furthermore, it is also possible to continue and prepare in the perimeter of an absorption-of-sound layer as an arrangement configuration of a film layer, and to prepare in the any 1 direction of the front-face side of an absorption-of-sound layer and a rear-face side or both sides. Furthermore, opening may be prepared in a part of film layer, and an absorption-of-sound layer may be laminated partially, or you may make it make an air space intervene between an absorption-of-sound layer and a film layer.

[0029] Moreover, while unifying an absorption-of-sound layer and a film layer with a shaping vertical mold, the vacuum force is made to act on a film layer from a shaping punch, concave heights are formed in a film layer, a film layer and an absorption-of-sound layer are pasted up in a crevice, and you may make it form an air space by heights as a configuration which prepares an air space between a film layer and an acoustic-material layer. In that case, as a film layer, if the hot melt film is laminated at the rear face of a nylon (polyamide resin) film, good thermal resistance and a moldability are securable.

[0030] 2 is in addition, suitable [the area of jointing of a film layer and an absorption-of-sound layer / as for the height of 2 and an air space] for the area of 2 and an air space 1-100cm 1-100cm 0.5-100cm.

[0031] And according to invention according to claim 4 to 10, since lamination processing of the film layer is carried out on the other hand at least on the rear face of front of an absorption-of-sound layer in a field, the noise insulation layer in which the conventional weight increases can be abolished, and it can contribute to lightweight-ization.

[0032] Moreover, since the reflective noise reflected by the panel inside of the vehicle interior of a room can absorb sound inside an absorption-of-sound layer, the sound

build-up of the vehicle interior of a room can be prevented, and the absorption-of-sound engine performance of the vehicle interior of a room can be raised. [0033] Furthermore, if the configuration which sticks a film layer on the front-face side of an absorption-of-sound layer is adopted, dust, such as fibrin of an absorption-of-sound layer, can prevent being scattered about indoors.

[0034] Moreover, if the configuration which forms an air space between a film layer and an absorption-of-sound layer by fabricating a film layer to concave convex is adopted, there is no tear of a film layer, and generating of Siwa etc. is not conspicuous with the buffer nature of an air space.

[0035] Furthermore, in a part for an air layer, since the film layer has floated from the absorption-of-sound layer, while film resonance occurs and an acoustic absorptivity improves, the acoustic absorptivity like [acoustic absorptivity] an air space does not look the role of a back air space improves to the transparency noise from a car-body panel side.

[0036] Next, invention of this application according to claim 11 is characterized by carrying out the laminating of the epidermis layer which becomes the whole surface of a field, or a part from a foaming resin web material on the other hand at least while on the rear face of front of an absorption-of-sound layer.

[0037] Here, as a foaming resin web material, an olefin system foaming sheet, EPPM, etc. can be used and 15mm or less of thickness is good at surface density 0.005 - less than two 0.3 kg/m.

[0038] And according to invention according to claim 11, since-izing of the product weight of an insulator can be carried out [lightweight], workability and fuel consumption effectiveness can be raised.

[0039] Furthermore, as an epidermis layer, when the foaming resin sheet of independent foaming structure is used, the indoor noise can be mitigated by cutoff of the transparency noise which penetrates a car-body panel, and the absorption of sound of the vehicle interior of a room which penetrated the insulator.

[0040] Moreover, as an epidermis layer, when it is used for the foaming resin sheet of continuation foaming structure, compared with cutoff of the transparency noise which penetrates a car-body panel, the absorption-of-sound effectiveness in the vehicle interior of a room which penetrated the insulator can be expected.

[0041] Subsequently, invention of this application according to claim 12 prepares undercover one in the panel bottom of the vehicle interior of a room, and is characterized by carrying out the sound pressure fall of the transparency noise penetrated through an absorption-of-sound layer from a car-body panel in a closed space in the above-mentioned panel.

[0042] And since the building envelope of the panel of the vehicle interior of a room is made in a closed space by attaching undercover one to the panel bottom of the vehicle interior of a room according to invention according to claim 12, the noise which penetrates an absorption-of-sound layer through a car-body panel can raise more the absorption-of-sound engine performance of the vehicle interior of a room by not carrying out a sound leak at an interior-of-a-room side, and carrying out sound pressure attenuation in the vehicle interior of a room.

[0043]

[Embodiment of the Invention] Hereafter, the operation gestalt of the insulator for automobiles concerning this invention is explained to a detail, referring to an accompanying drawing.

[0044] The sectional view in which drawing 1 thru/or drawing 4 showing the 1st operation gestalt of this invention, and showing the condition that drawing 1 attached the insulator dash for automobiles in the dash panel, the explanatory view in which drawing 2 shows the absorption-of-sound mechanism of this insulator dash, the graph with which drawing 3 shows the sound isolation engine performance of this insulator dash, and drawing 4 are the general drawing showing the modification of this insulator dash. Moreover, the sectional view in which drawing 5 thru/or drawing 7 showing the 2nd operation gestalt of this invention, and showing the condition that drawing 5 attached the insulator dash in the dash panel, the graph with which drawing 6 shows the sound isolation engine performance of this insulator dash, and drawing 7 are the explanatory views showing the modification of this insulator dash.

[0045] Furthermore, the sectional view in which drawing 8 thru/or drawing 10 showing the 3rd operation gestalt of this invention, and showing the condition that drawing 8 attached the insulator dash panel in the dash panel, the fragmentary sectional view in which drawing 9 shows the important section of this insulator dash, and drawing 10 are the explanatory views showing the outline of the forming cycle of this insulator dash.

[0046] Moreover, the sectional view in which drawing 11 thru/or drawing 15 showing the 4th operation gestalt of this invention, and showing the condition that drawing 11 attached the insulator dash in the dash panel, The explanatory view showing the variation of a film layer [in / in drawing 12 / this insulator dash], Each explanatory view in which the graph which shows the sound isolation engine performance [in / in drawing 13 / this insulator dash], drawing 14 , and drawing 15 show the modification of this insulator dash, and drawing 16 are what shows the 5th operation gestalt of this invention. It is the sectional view showing the condition of having attached the insulator dash for automobiles in the dash panel.

[0047] First, the 1st operation gestalt of this invention is explained based on drawing 1 thru/or drawing 4 .

[0048] In drawing 1 , the dash panel 10 which divides an engine room E and the vehicle room R It is divided by dash upper section 10a, dash lower section 10b, and toeboard section 10c from an upper part side. To the front-face side of the insulator dash 20 with which the insulator dash 20 is attached decoratively along the indoor side of a dash panel 10, and it is equipped on toeboard section 10c The floor carpet 30 is laid in the shape of a lap, and the Johan part of the insulator dash 20 with which the Johan parts of dash upper section 10a of a dash panel 10 and dash lower section 10b are equipped is further located in an instrument panel 40. In addition, the instrument panel 40 is equipped with the crush pad which is not illustrated.

[0049] By the way, even if it lightweight-izes, the insulator dash 20 concerning this invention is constituted so that it may have sufficient sound isolation property, while lightweight-izing product weight sharply, in order to raise fuel consumption effectiveness and attachment workability.

[0050] That is, the insulator dash 20 was taken as the absorption-of-sound layer 21 monolayer configuration which consists of the fiber aggregate. This absorption-of-sound layer 21 as that quality of the material The felt, PET (polyester) fiber, It consists of a fiber aggregate which made

papers (pulp etc.) fibrous, and is fabricated in accordance with the field configuration of a dash panel 10 by using thermoplastics or thermosetting resin as a binder, and the thickness of the absorption-of-sound layer 21 is 5-150mm. The surface density is set as 3.0 kg/m², and the average sound absorption coefficient of 630-4000Hz of frequency regions of the absorption-of-sound layer 21 uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0051] In this operation gestalt, it is fabricated by the configuration of the request which met the field configuration of a dash panel 10 with cold-press-molding metal mold with a desired metal mold configuration, after mixing low-melt point point PET in playback PET fiber as a binder, being fabricated by press working of sheet metal in the shape of [desired] a mat after heat-treating what was accumulated in the shape of a mat on the conveyor belt and carrying out heating softening of this original fabric mat.

[0052] In addition, it is fabricated in that into which thermosetting resin was infiltrated as a binder by the necessary configuration using hot pressing.

[0053] If it consists of the fiber aggregates which thermoplastics or thermosetting resin is sufficient as as a binder, and were excellent in sound absorption characteristics in this invention as explained above, neither the quality of the material nor especially a shaping method of construction will be limited.

[0054] Thus, it becomes what was excellent also in the workability which attaches the insulator dash 20 in a dash panel 10 while it can mitigate product weight sharply and can raise fuel consumption effectiveness by this lightweight-ization, since the insulator dash 20 for automobiles concerning this invention can abolish noise insulation layers, such as a rubber sheet with which the conventional weight increases since it consists of absorption-of-sound layer 21 monolayers, or a vinyl chloride sheet.

[0055] Furthermore, the insulator dash 10 concerning this invention writes as an absorption-of-sound layer 21 monolayer configuration, and demonstrates the absorption-of-sound mechanism shown in drawing 2 .

[0056] That is, a part insulates the noise (inside F1 of drawing) generated in an engine room E with a dash panel 10, and the remainder invades in the absorption-of-sound layer 21 as noise (inside F2 of drawing).

[0057] And it becomes the recursive transparency noise (the inside F5 of drawing) which the transparency noise (inside F3 of drawing) which remains invades in an instrument panel 40, is reflected in the inside of an instrument panel 40, and this reflective noise (inside F4 of drawing) penetrates in the absorption-of-sound layer 21 again, and it absorbs sound by the absorption-of-sound function of an absorption-of-sound layer 21 as a result of absorption of sound of noise [a part of] shown by the above F2 by the absorption-of-sound function of the absorption-of-sound layer 21.

[0058] Thus, while absorbing sound a part of noise spread to an interior-of-a-room side through a dash panel 10 by adopting an absorption-of-sound layer 21 monolayer configuration, the transparency noise which penetrates the absorption-of-sound layer 21 and is penetrated to the vehicle interior of a room is reflected in an instrument panel 40, and the transmitted sound which was not decreased in the instrument panel 40 can be effectively prevented by decreasing this reflective noise by the absorption-of-sound layer 21 again.

[0059] As the graph of drawing 3 shows, absorption-of-sound / noise insulation engine performance (a) of the insulator dash 20 by absorption-of-sound layer 21 monolayer the sound isolation property of the above-mentioned insulator dash 20 It is **** of the noise insulation

engine performance (b) of an instrument panel 40, absorption-of-sound / noise insulation engine performance (c) by the absorption-of-sound layer 21, and the absorption-of-sound engine performance in an instrument panel 40 (d), and it is in ** from a graph that the noise of the frequency region level in inside compass and a loud-sound region can be decreased especially effectively.

[0060] in order that [subsequently,] drawing 4 may show the modification of the above-mentioned insulator dash 20 and may raise the absorption-of-sound nature in an instrument panel 40 -- the instrument-panel 40 bottom -- instrumental -- undercover one -- 41 is installed, it is the description to have made the inside of an instrument panel 40 into a closed space, by this, the absorption-of-sound engine performance in an instrument panel 40 can be raised more, and improvement in a sound isolation property can be expected further.

[0061] Subsequently, drawing 5 thru/or drawing 7 show the 2nd operation gestalt of this invention, and the epidermis layer 22 to which the insulator dash 20 in this 2nd operation gestalt is from the fiber aggregate on the front-face side of the absorption-of-sound layer 21 is unified.

[0062] It is the description that the epidermis layer 22 is set as high density rather than the absorption-of-sound layer 21 that the thing of the same configuration as the 1st operation gestalt should just be used for the absorption-of-sound layer 21.

[0063] Surface density intercepts a part by less than two 0.005 - 0.3 kg/m to the noise in which this epidermis layer 22 invades in the absorption-of-sound layer 21 through an engine room E to the dash panel 10 by the quality of the material of the epidermis layer 22 consisting of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), and absorbs sound a part. And the transparency noise which penetrated the epidermis layer 22 is reflected by the inside of an instrument panel 40, and it can prevent certainly that it is filled in an instrument panel 40, and a sound is made in order to invade in the absorption-of-sound layer 21 and to absorb sound through the epidermis layer 22 again.

[0064] Moreover, in this operation gestalt, although the epidermis layer 22 has been arranged to the front-face side of the absorption-of-sound layer 21, the epidermis layer 22 laminates the epidermis layer 22 in a part of absorption-of-sound layer 21 partially with the **** property of a car by uniting with a dash panel 10 side, i.e., the rear face of the absorption-of-sound layer 21, and it is good also considering the part which remains as absorption-of-sound layer 21 monolayer.

[0065] And the average sound absorption coefficient of the insulator dash 20 which consists of an absorption-of-sound layer 21 and an epidermis layer 22 performs an ingredient setup so that it may become 15 - 95%, and it is taken as 630-4000Hz average of normal incidence sound absorption coefficients in that case. Moreover, the thickness of the epidermis layer 22 is 15mm, and the thickness of the insulator dash 20 is set up among 5-150mm.

[0066] Furthermore, what is necessary is to heat-treat by making hot melt powder adhere to the plane of composition of the epidermis layer 22, to carry out the laminating of the epidermis layer 22 beforehand formed in the shape of a mat where hot melt is fused, and just to unify by cold press molding, after sprinkling fibrin in the shape of a conveyor with a card ring, being accumulated in the shape of a mat as a shaping method of construction of the absorption-of-sound layer 21 and the absorption-of-sound layer 22 and creating the original fabric mat of the absorption-of-sound layer 21.

[0067] And it turns out that the sound isolation engine performance (a) of the insulator dash 20 is what ****(ed) three persons of the absorption-of-sound engine performance (d) in the insulation (b) of an instrument panel 40, the absorption-of-sound nature of the insulator dash 20, insulation

(c), and an instrument panel 40, and the good sound isolation engine performance in 630-4000Hz is obtained in the sound isolation engine performance of the insulator dash 20 in this 2nd operation gestalt as the graph of drawing 6 shows.

[0068] In addition, as a presentation of the insulator dash used for this measurement, the thing of PET fiber 1.2 kg/m² was used as an absorption-of-sound layer 21 as 2.0kg of PET fiber/, m², and an epidermis layer 22.

[0069] Thus, as lightweight-ization is attained and fuel consumption effectiveness is raised, and it is shown in the graph of drawing 6 mentioned above while having the same operation effectiveness as the 1st operation gestalt that attachment workability will also become good since the noise insulation layer in which the conventional weight increases can be abolished also in the insulator dash 20 in the 2nd operation gestalt, the outstanding sound isolation engine performance is obtained.

[0070] furthermore, it is shown in drawing 7 -- as -- the 2nd operation gestalt -- also setting -- the instrument-panel 40 bottom -- instrumental -- undercover one -- the absorption-of-sound engine performance in an instrument panel 40 can be raised by making the inside of an instrument panel 40 into a closed space by attaching 41.

[0071] Drawing 8 thru/or drawing 10 show the 3rd operation gestalt of this invention, the same sign is given to the same part as the 1st and 2nd operation gestalt mentioned above, and detailed explanation is omitted.

[0072] As shown in drawing 8, the layered product which laminated hot melt film 23b is used for the nonwoven fabric 23a rear face as an epidermis layer 23 by which the laminating of the insulator dash 20 in this operation gestalt is carried out to the front-face side of the absorption-of-sound layer 21.

[0073] The above-mentioned nonwoven fabric 23a is made from polyester fiber, metsuke amount is set as 10 - 100 g/m², hot melt film 23b functions as an adhesion medium, and the thing with a thickness of 10-100 micrometers is used.

[0074] Furthermore, as the relation between the absorption-of-sound layer 21 and the epidermis layer 23 is shown in drawing 9, the epidermis layer 23 is fabricated by concave convex, the crevice of the epidermis layer 23 is formed in two or more places, it is set up as jointing 24 of the absorption-of-sound layer 21 and the epidermis layer 23, and the area S1 of this jointing 24 is 2 0.5-100cm.

[0075] Moreover, the heights of the epidermis layer 23 are equivalent to an air space 25, the area S2 of this air space 25 is 2 1-100cm, and height h of an air space 25 is 1-10mm.

[0076] And since a product front face is fabricated by concave convex, it is equivalent to heights and the air space 25 between the absorption-of-sound layer 21 and the epidermis layer 23 is formed so that it may illustrate, the epidermis layer 23 stops being torn easily due to the buffer action of this air space 25, and the workability with a group to a car-body panel improves.

[0077] Furthermore, the curvature by the difference of contraction between the absorption-of-sound layer 21 and the epidermis layer 23 is suppressed, and the fit nature to a panel also improves.

[0078] Moreover, since the surface area of the epidermis layer 23 is increasing to the noise from an interior-of-a-room side while Siwa etc. cannot be conspicuous and being able to raise the appearance engine performance, since it is on irregularity, the absorption-of-sound engine performance of a product front face improves.

[0079] Next, about the shaping approach of the insulator dash 20 shown in drawing 8 and

drawing 9 , if it explains based on drawing 10 , the shaping metal mold 50 consists of a shaping punch 51 and shaping female mold 52, countless vacuum suction hole 51a is established in the mold face of the shaping punch 51, and while the vacuum suction device which is not illustrated is attached, the mold face of the shaping punch 51 is set as the concave convex 53 corresponding to product irregularity. On the other hand, blow hole 52a is established innumerable and the Ayr blow device which is not illustrated is attached to the mold face of the shaping female mold 52.

[0080] And while supplying in the shaping metal mold 50 and mold clamp carrying out of the shaping vertical molds 51 and 52 after carrying out the epidermis layer 23 with the infrastructure heating furnace and carrying out heating softening processing of the absorption-of-sound layer 21 with a hot blast heating furnace when the shaping metal mold 50 is in a mold aperture condition The insulator dash 20 which formed the air space 25 which floated the epidermis layer 23 from the absorption-of-sound layer 21 can be fabricated by carrying out vacuum suction of the epidermis layer 23 from the shaping punch 51, and supplying Ayr in the absorption-of-sound layer 21 from the shaping female mold 52.

[0081] As drawing 11 thru/or drawing 15 show the 4th operation gestalt of this invention and shows it to drawing 11 , as for the insulator dash 20 in this operation gestalt, the film layer 26 is united with the front-face side of the absorption-of-sound layer 21.

[0082] Therefore, while lightweight-ization can be attained and being able to raise attachment workability by abolishing noise insulation layers, such as a rubber sheet with which the conventional weight increases also in this operation gestalt, and a vinyl chloride sheet The transparency noise which penetrates the absorption-of-sound layer 21 and the film layer 26, and invades in an instrument panel 40 like the above-mentioned operation gestalt Since it is reflected by instrument-panel 40 inside, it invades again in the film layer 26 and the absorption-of-sound layer 21 and acoustic treatment is carried out, In order to have prevented the sound build-up in an instrument panel 40, for the noise to have not echoed, to have the same operation effectiveness of raising the silence of the vehicle interior of a room and to unite the film layer 26 with the absorption-of-sound layer 21 on structure, structure is simple and manufacture is also easy structure.

[0083] The unification with this film layer 26 and the absorption-of-sound layer 21 can consider the various variations shown in drawing 12 by the **** property of a car, or the sound absorption characteristics of the absorption-of-sound layer 21.

[0084] Drawing 12 (a) is what united the film layer 26 with the front-face side of the absorption-of-sound layer 21: Drawing 12 (b) Although it is the configuration which covered the perimeter of the absorption-of-sound layer 21, and was surrounded by the film layer 26, drawing 12 (c) is the configuration which intervened

the air space 25 and has arranged the film layer 26 in part to the front face of the absorption-of-sound layer 21, and both sides on the back and drawing 12 (d) unites the film layer 26 with the front face of the absorption-of-sound layer 21 It is the configuration which prepared opening 26a in the film layer 26 in part, and covered the absorption-of-sound layer 21 with the film layer 26 partially.

[0085] What is necessary is to lay the film layer 26 on top of the original fabric mat of this absorption-of-sound layer 21, and just to unite with it after heating softening processing, after carrying out coating processing of the hot melt system powder in using the absorption-of-sound layer 21 used for the 1st operation gestalt and the 2nd operation gestalt as a method of construction which unites the film layer 26 with the above-mentioned absorption-of-sound layer

21.

[0086] In addition, as the above-mentioned film layer 26, the quality of the material can also use those complex for a polyolefine system resin film, a polyurethane system resin film, a polyester system resin film, paper, etc., and a 10 micrometers - 200 micrometers thing is used for the thickness of the film layer 26. Moreover, the film layer 26 does not ask the existence of permeability, but, as for this film layer 26, is effective in preventing that the fiber waste of the absorption-of-sound layer 21 etc. is outside omitted.

[0087] And when the film layer 26 equipped with permeability is used especially as a film layer 26, it is possible to be able to intercept a part of transmitted sound from an engine room E, to incorporate again the transparency noise in the instrument panel 40 penetrated further in the absorption-of-sound layer 21, and to absorb sound the reflective noise.

[0088] A graph shows the sound isolation property of the insulator dash 20 in the 4th operation gestalt by drawing 13 .

[0089] And also in this 4th operation gestalt, the total sound isolation property (a) of the insulator dash 20 is **** of the insulation (b) of an instrument panel 40, the absorption-of-sound nature of an insulator, insulation (c), and the absorption-of-sound nature in an instrument panel 40 (d), and it can expect the good absorption-of-sound nature in 630-4000Hz that the graph of drawing 13 shows.

[0090] furthermore, the 4th operation gestalt is shown in drawing 14 -- as -- the instrument-panel 40 bottom -- instrumental -- undercover one -- the absorption-of-sound nature in an instrument panel 40 can be raised by making the inside of an instrument panel 40 into a closed space by preparing 41.

[0091] Furthermore, as shown in drawing 15 , the film layer 26 is floated in part from the absorption-of-sound layer 21, you may make it form an air space 25, and the ingredient which laminated the hot melt film as a glue line fits the rear face of a nylon (polyamide) resin film in consideration of thermal resistance and a moldability as a film layer 26 in that case.

[0092] In addition, the configuration of jointing 24 or an air space 25 of the shaping approach is the same as that of the time of the epidermis layer 23 of the 3rd operation gestalt that what is necessary is just to use the shaping metal mold 50 shown in drawing 10 .

[0093] Finally, the 5th operation gestalt of this invention is explained along with drawing 16 . With this operation gestalt, the foaming resin sheet material is used as an epidermis layer 27. For example, by foaming form material, such as olefin system foaming resin and EPDM, it is a surface density 0.005 - less than two 0.3 kg/m thing, and; as for thickness, the thing 15mm or less is suitable.

[0094] And also in this operation gestalt, since it is the configuration which uses a foaming resin sheet material as an epidermis layer 27, izing of the insulator dash 20 can be carried out [lightweight], and workability and fuel consumption effectiveness can be raised.

[0095] Moreover, as an epidermis layer 27, when the form material of independent foaming structure is used, the noise indoor by cutoff of the transmitted sound from an engine room E and absorption of sound of the sound in the instrumental 40 which penetrated the insulator dash 20 can be mitigated.

[0096] On the other hand, when the form material of continuation foaming structure is used, absorption of sound of the sound in the instrumental 40 which penetrated the insulator dash 20 compared with cutoff of the transmitted sound from an engine room E can be made to think as important as an epidermis layer 27.

[0097] As mentioned above, although the operation gestalt of the insulator dash 20 for automobiles was explained, it is applicable to the insulator at large [for automobiles] with which a car-body panel is equipped.

[0098]

[Effect of the Invention] The insulator for automobiles concerning this invention as explained above The epidermis layer of the absorption-of-sound layer monolayer configuration which consists of the fiber aggregate, or an absorption-of-sound layer which is from the high density fiber aggregate on a field side on the other hand at least, Or since it is the configuration of carrying out the laminating of the film layer and is the configuration which abolishes noise insulation layers, such as a rubber sheet with which the conventional weight increases, and a vinyl chloride sheet, while being able to promote lightweight-ization of an insulator sharply and raising fuel consumption effectiveness It has the operation effectiveness that the attachment workability of an insulator is made to a good thing.

[0099] Furthermore, in order that it may be reflected by the panel of the vehicle interior of a room, it may return to an absorption-of-sound layer again and the part may absorb sound, the transparency noise which penetrates a part of noise spread to an interior-of-a-room side through a car-body panel to an interior-of-a-room side while absorbing sound in an absorption-of-sound layer since the insulator concerning this invention is an aeration mold configuration can prevent the sound build-up in the vehicle interior of a room, and has the effectiveness that the sound-isolation property of the vehicle interior of a room can raise sharply.

[0100] Moreover, with the configuration which laminates the epidermis layer which turns into an absorption-of-sound layer from the high density fiber aggregate, and a film layer, since an epidermis layer and a film layer have protector ability, it can prevent that the fibrin of an absorption-of-sound layer is outside omitted, and is effective in the clean environment of the vehicle interior of a room being securable.

[0101] In addition, if the laminating unification of a part of epidermis layer is carried out in the condition of having floated, from an absorption-of-sound layer when sticking epidermis layers, such as a nonwoven fabric or a film layer, on the front face of an absorption-of-sound layer Since a product front face serves as concave convex while there is no tear of an epidermis layer and the fit nature to a car-body panel also improves by the buffer action of an air space, the noise reflects irregularly in the vehicle interior of a room, and has the effectiveness that absorption-of-sound effectiveness can be raised.

TECHNICAL FIELD

[Field of the Invention] It relates to the insulator for automobiles of the aeration mold with which the outstanding sound isolation engine performance is obtained while this invention relates to the insulator for automobiles with which the indoor side of a car-body panel is decorated, abolishes the noise insulation layer in which weight increases especially and attains lightweight-ization.

PRIOR ART

[Description of the Prior Art] usually, as shown in drawing 17 , to the indoor side side of the dash panel 1 which divides an engine room E and the vehicle room R The insulator dash 2 is attached decoratively. This insulator dash 2 The noise insulation

layer 3 which consists of high density ingredients, such as a playback rubber sheet and a playback vinyl chloride sheet, so that it may expand to drawing 18 and may be shown, It consists of absorption-of-sound layers 4 which consist of the fiber aggregate by which laminating unification is carried out at the rear-face side, and the floor carpet 5 is laid by the bottom front face of the insulator dash 2 in the shape of a lap, and the upper part side of the insulator dash 2 is located in an instrument panel 6.

[0003] And if the sound isolation mechanism of the insulator dash 2 of the conventional two-layer structure is explained based on drawing 19 , the noise with which the noise f1 of the engines in an engine room E and accessory vessels penetrates a dash panel 1, spreads it to an interior-of-a-room side, and indicates the noise which a part insulates with a dash panel 1 and remains to be by f2 will invade in the insulator dash 2.

[0004] And although this noise f2 insulates in the noise insulation layer 3 while that part absorbs sound in the absorption-of-sound layer 4, a part invades in an instrument panel 6 as transparency noise f3.

[0005] Furthermore, it reflects by the inside of an instrument panel 6, this reflective noise f4 is again reflected in the noise insulation layer 3, the reflective noise f4 and f5 turns into reverberation in the space of an instrument panel 6 as a result, and the transparency noise f3 which invades in an instrument panel 6 has become the big factor from which this reverberation prevents the silence of the vehicle interior of a room.

[0006] And in this conventional sound isolation (noise insulation and absorption of sound) mechanism, noise insulation / absorption-of-sound rate in the insulator dash 2 and the absorption-of-sound rate within an instrument panel 6 are about 9:1 rates in ratio.

EFFECT OF THE INVENTION

[Effect of the Invention] The insulator for automobiles concerning this invention as explained above The epidermis layer of the absorption-of-sound layer monolayer configuration which consists of the fiber aggregate, or an absorption-of-sound layer which is from the high density fiber aggregate on a field side on the other hand at least, Or since it is the configuration of carrying out the laminating of the film layer and is the configuration which abolishes noise insulation layers, such as a rubber sheet with which the conventional weight increases, and a vinyl chloride sheet, while being able to promote lightweight-ization of an insulator sharply and raising fuel consumption effectiveness It has the operation effectiveness that the attachment workability of an insulator is made to a good thing.

[0099] Furthermore, in order that it may be reflected by the panel of the vehicle interior of a room, it may return to an absorption-of-sound layer again and the part may absorb sound, the transparency noise which penetrates a part of noise spread to an interior-of-a-room side through a car-body panel to an interior-of-a-room side while absorbing sound in an absorption-of-sound layer since the insulator concerning this invention is an aeration mold configuration can prevent the sound build-up in the vehicle interior of a room, and has the effectiveness that the sound-isolation property of the vehicle interior of a room can raise sharply.

[0100] Moreover, with the configuration which laminates the epidermis layer which turns into an absorption-of-sound layer from the high density fiber aggregate, and a film layer, since an epidermis layer and a film layer have protector ability, it can prevent that the fibrin of an absorption-of-sound layer is outside omitted, and is effective in the clean environment of the vehicle interior of a room being securable.

[0101] In addition, if the laminating unification of a part of epidermis layer is carried out in the condition of having floated, from an absorption-of-sound layer when sticking epidermis layers, such as a nonwoven fabric or a film layer, on the front face of an absorption-of-sound layer Since a product front face serves as concave convex while there is no tear of an epidermis layer and the fit nature to a car-body panel also improves by the buffer action of an air space, the noise reflects irregularly in the vehicle interior of a room, and has the effectiveness that absorption-of-sound effectiveness can be raised.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Thus, since the conventional insulator dash 2 consists of bilayer layered products of the noise insulation layer 3 made from the high density ingredient, and the absorption-of-sound layer 4 which consists of the fiber aggregate and the weight of the noise insulation layer 3 increases especially, it moves against lightweight-ization of a product and the trouble of worsening the attachment workability of decline in fuel consumption effectiveness or the insulator dash 2 is pointed out.

[0008] Furthermore, in the sound isolation mechanism of the conventional insulator dash 2, to noise insulation / absorption-of-sound function by the double-wall noise insulation function, since the absorption-of-sound function within an instrument panel 6 was very small, the dissolution of the transmitted sound within an instrument panel 6 which was not decreased was made into sound isolation top pressing need at the Lord of the insulator dash 2.

[0009] It aims at offering the insulator for automobiles which made it possible to raise the absorption-of-sound engine performance while this invention was made in view of such a situation, abolishes the noise insulation layer in which it is the insulator for automobiles with which the indoor side of a car-body panel is decorated, and weight increases especially and promotes lightweight-ization.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention of this application according to claim 1 It is the insulator for automobiles with which the indoor side side of a car-body panel is decorated. This insulator While absorbing sound the noise which consists of absorption-of-sound layer monolayers which used the fiber Plastic solid as the base, and invades in an absorption-of-sound layer through a car-body panel The transparency noise which penetrated the absorption-of-sound layer reflects by the panel inside of the vehicle interior of a room, carries out recurrence into an absorption-of-sound layer from a front-face side again, and is characterized by being constituted as an aeration mold insulator which can absorb sound this reflective noise.

[0011] Here, the quality of the material of an absorption-of-sound layer consists of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), it is two or less surface density 3.0 kg/m, and the average sound absorption coefficient of 630-4000Hz of frequency regions uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0012] And according to invention according to claim 1, since it consists of absorption-of-sound layer monolayers, an insulator can abolish the noise insulation layer in which the conventional weight increases, and large lightweight-ization of an insulator of it is attained.

[0013] Furthermore, since the noise insulation layer of non-permeability was abolished, the noise spread from a car-body panel to an interior-of-a-room side is penetrated to the vehicle interior of a room through an absorption-of-sound layer, and after that, the reflective noise reflected by the inside of an indoor panel will absorb sound from an absorption-of-sound layer front-face side again, and can suppress the sound build-up of the vehicle interior of a room.

[0014] Subsequently, invention of this application according to claim 2 is characterized by carrying out the laminating of the epidermis layer which becomes a field from the high density fiber aggregate set as high density from the surface density of an absorption-of-sound layer on the other hand at least while on the rear face of front of an absorption-of-sound layer.

[0015] Here, the quality of the material of an epidermis layer consists of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), by surface density 0.005 - less than two 0.3 kg/m, the thickness of an epidermis layer is 15mm and the epidermis layer is set as high density from the absorption-of-sound layer.

[0016] Moreover, with the **** property of a car etc., the epidermis layer is possible also for the whole surface or preparing partially and setting it as either the front-face side of an absorption-of-sound layer or a rear-face side and both sides, and the ingredient with which the average sound absorption coefficient of 630-4000Hz of frequency regions of an insulator dash which consist of an absorption-of-sound layer and an epidermis layer was adjusted to 30 - 90% in thickness the o'clock of 20mm is used for it.

[0017] In addition, let thickness of the whole insulator-dash be the range of 5-150mm.

[0018] And since the noise insulation layer in which the both sides of an absorption-of-sound layer and an epidermis layer tell that they constitute from the fiber aggregate, and the conventional weight increases was abolished according to invention according to claim 2, while enabling lightweight-ization of a product By setting especially the epidermis layer which consists of the fiber aggregate of high density as the front face of an absorption-of-sound layer, the transmitted sound from a car-body panel can be intercepted, and the noise of the vehicle interior of a room penetrated especially can be absorbed sound efficiently.

[0019] Furthermore, omission of the dust from an absorption-of-sound layer and fibrin can be effectively prevented by arranging the absorption-of-sound layer which is from the high density fiber aggregate on the front-face side of an absorption-of-sound layer.

[0020] Invention of this application according to claim 3 is characterized by forming

an air space in it by the heights of an epidermis layer, while having pasted the front face of an absorption-of-sound layer with the absorption-of-sound layer in the crevice of an epidermis layer, when the epidermis layer is fabricated by concave convex, while the laminating of the epidermis layer which laminated the hot melt film at the nonwoven fabric rear face is carried out.

[0021] Here, the nonwoven fabric as an epidermis layer is made from polyester fiber etc., and metsuke amount is 10-100g/m². Moreover, materials are polyolefine, a polyamide, polyester, an ethylene-vinyl acetate copolymer, etc., and a thing with a thickness of 10-100 micrometers is used for a hot melt film.

[0022] Furthermore, as a shaping means of an epidermis layer, after carrying out the epidermis layer with the infrastructure heating furnace and carrying out heating softening processing of the absorption-of-sound layer with a hot blast heating furnace, both sides are thrown in in a shaping vertical mold in piles, the vacuum force is made to act from a shaping punch, and the shape of toothing is fabricated in an epidermis layer at the same time it cools by applying the Ayr blow to an absorption-of-sound layer side from shaping female mold.

[0023] Here, the area of jointing of an epidermis layer and an absorption-of-sound layer is [the height of 2 and an air space of the area of an air space] 1-10mm 1-100cm in 2 0.5-100cm.

[0024] And since the product front face is fabricated by concave convex, while according to invention according to claim 3 Siwa etc. is not conspicuous, an epidermis layer cannot be easily torn due to the buffer nature by the air space and assemblability improves, the curvature deformation from which the difference of contraction becomes a cause can also be prevented.

[0025] Furthermore, with the irregularity on the front face of a product, while being able to carry out scattered reflection of the noise in the vehicle interior of a room, since product surface area is increasing, an acoustic absorptivity improves.

[0026] Invention of this application according to claim 4 to 10 is characterized by using the film layer as an epidermis layer which carries out a laminating to an absorption-of-sound layer.

[0027] Here, the quality of the material of a film layer may constitute polyolefine system resin, polyurethane system resin, PET, paper, etc. from those complex, the thickness of a film layer has desirable 10-200 micrometers, and the existence of permeability does not ask.

[0028] Furthermore, it is also possible to continue and prepare in the perimeter of an absorption-of-sound layer as an arrangement configuration of a film layer, and to prepare in the any 1 direction of the front-face side of an absorption-of-sound layer and a rear-face side or both sides. Furthermore, opening may be prepared in a part of film layer, and an absorption-of-sound layer may be laminated partially, or you may make it make an air space intervene between an absorption-of-sound layer and a film layer.

[0029] Moreover, while unifying an absorption-of-sound layer and a film layer with a shaping vertical mold, the vacuum force is made to act on a film layer from a shaping punch, concave heights are formed in a film layer, a film layer and an absorption-of-sound layer are pasted up in a crevice, and you may make it form an air

space by heights as a configuration which prepares an air space between a film layer and an acoustic-material layer. In that case, as a film layer, if the hot melt film is laminated at the rear face of a nylon (polyamide resin) film, good thermal resistance and a moldability are securable.

[0030] 2 is in addition, suitable [the area of jointing of a film layer and an absorption-of-sound layer / as for the height of 2 and an air space] for the area of 2 and an air space 1-100cm 1-100cm 0.5-100cm.

[0031] And according to invention according to claim 4 to 10, since lamination processing of the film layer is carried out on the other hand at least on the rear face of front of an absorption-of-sound layer in a field, the noise insulation layer in which the conventional weight increases can be abolished, and it can contribute to lightweight-ization.

[0032] Moreover, since the reflective noise reflected by the panel inside of the vehicle interior of a room can absorb sound inside an absorption-of-sound layer, the sound build-up of the vehicle interior of a room can be prevented, and the absorption-of-sound engine performance of the vehicle interior of a room can be raised.

[0033] Furthermore, if the configuration which sticks a film layer on the front-face side of an absorption-of-sound layer is adopted, dust, such as fibrin of an absorption-of-sound layer, can prevent being scattered about indoors.

[0034] Moreover, if the configuration which forms an air space between a film layer and an absorption-of-sound layer by fabricating a film layer to concave convex is adopted, there is no tear of a film layer, and generating of Siwa etc. is not conspicuous with the buffer nature of an air space.

[0035] Furthermore, in a part for an air layer, since the film layer has floated from the absorption-of-sound layer, while film resonance occurs and an acoustic absorptivity improves, the acoustic absorptivity like [acoustic absorptivity] an air space does not look the role of a back air space improves to the transparency noise from a car-body panel side.

[0036] Next, invention of this application according to claim 11 is characterized by carrying out the laminating of the epidermis layer which becomes the whole surface of a field, or a part from a foaming resin web material on the other hand at least while on the rear face of front of an absorption-of-sound layer.

[0037] Here, as a foaming resin web material, an olefin system foaming sheet, EPPM, etc. can be used and 15mm or less of thickness is good at surface density 0.005 - less than two 0.3 kg/m.

[0038] And according to invention according to claim 11, since-izing of the product weight of an insulator can be carried out [lightweight], workability and fuel consumption effectiveness can be raised.

[0039] Furthermore, as an epidermis layer, when the foaming resin sheet of independent foaming structure is used, the indoor noise can be mitigated by cutoff of the transparency noise which penetrates a car-body panel, and the absorption of sound of the vehicle interior of a room which penetrated the insulator.

[0040] Moreover, as an epidermis layer, when it is used for the foaming resin sheet of continuation foaming structure, compared with cutoff of the transparency noise which penetrates a car-body panel, the absorption-of-sound effectiveness in the vehicle

interior of a room which penetrated the insulator can be expected.

[0041] Subsequently, invention of this application according to claim 12 prepares undercover one in the panel bottom of the vehicle interior of a room, and is characterized by carrying out the sound pressure fall of the transparency noise penetrated through an absorption-of-sound layer from a car-body panel in a closed space in the above-mentioned panel.

[0042] And since the building envelope of the panel of the vehicle interior of a room is made in a closed space by attaching undercover one to the panel bottom of the vehicle interior of a room according to invention according to claim 12, the noise which penetrates an absorption-of-sound layer through a car-body panel can raise more the absorption-of-sound engine performance of the vehicle interior of a room by not carrying out a sound leak at an interior-of-a-room side, and carrying out sound pressure attenuation in the vehicle interior of a room.

[0043]

[Embodiment of the Invention] Hereafter, the operation gestalt of the insulator for automobiles concerning this invention is explained to a detail, referring to an accompanying drawing.

[0044] The sectional view in which drawing 1 thru/or drawing 4 showing the 1st operation gestalt of this invention, and showing the condition that drawing 1 attached the insulator dash for automobiles in the dash panel, the explanatory view in which drawing 2 shows the absorption-of-sound mechanism of this insulator dash, the graph with which drawing 3 shows the sound isolation engine performance of this insulator dash, and drawing 4 are the general drawing showing the modification of this insulator dash. Moreover, the sectional view in which drawing 5 thru/or drawing 7 showing the 2nd operation gestalt of this invention, and showing the condition that drawing 5 attached the insulator dash in the dash panel, the graph with which drawing 6 shows the sound isolation engine performance of this insulator dash, and drawing 7 are the explanatory views showing the modification of this insulator dash.

[0045] Furthermore, the sectional view in which drawing 8 thru/or drawing 10 showing the 3rd operation gestalt of this invention, and showing the condition that drawing 8 attached the insulator dash panel in the dash panel, the fragmentary sectional view in which drawing 9 shows the important section of this insulator dash, and drawing 10 are the explanatory views showing the outline of the forming cycle of this insulator dash.

[0046] Moreover, the sectional view in which drawing 11 thru/or drawing 15 showing the 4th operation gestalt of this invention, and showing the condition that drawing 11 attached the insulator dash in the dash panel, The explanatory view showing the variation of a film layer [in / in drawing 12 / this insulator dash], Each explanatory view in which the graph which shows the sound isolation engine performance [in / in drawing 13 / this insulator dash], drawing 14 , and drawing 15 show the modification of this insulator dash, and drawing 16 are what shows the 5th operation gestalt of this invention. It is the sectional view showing the condition of having attached the insulator dash for automobiles in the dash panel.

[0047] First, the 1st operation gestalt of this invention is explained based on drawing 1 thru/or drawing 4 .

[0048] In drawing 1 , the dash panel 10 which divides an engine room E and the vehicle room R It is divided by dash upper section 10a, dash lower section 10b, and toeboard section 10c from an upper part side. To the front-face side of the insulator dash 20 with which the insulator dash 20 is attached decoratively along the indoor side of a dash panel 10, and it is equipped on toeboard section 10c The floor carpet 30 is laid in the shape of a lap, and the Johan part of the insulator dash 20 with which the Johan parts of dash upper section 10a of a dash panel 10 and dash lower section 10b are equipped is further located in an instrument panel 40. In addition, the instrument panel 40 is equipped with the crush pad which is not illustrated.

[0049] By the way, even if it lightweight-izes, the insulator dash 20 concerning this invention is constituted so that it may have sufficient sound isolation property, while lightweight-izing product weight sharply, in order to raise fuel consumption effectiveness and attachment workability.

[0050] That is, the insulator dash 20 was taken as the absorption-of-sound layer 21 monolayer configuration which consists of the fiber aggregate. This absorption-of-sound layer 21 as that quality of the material The felt, PET (polyester) fiber, It consists of a fiber aggregate which made papers (pulp etc.) fibrous, and is fabricated in accordance with the field configuration of a dash panel 10 by using thermoplastics or thermosetting resin as a binder, and the thickness of the absorption-of-sound layer 21 is 5-150mm. The surface density is set as 3.0 kg/m², and the average sound absorption coefficient of 630-4000Hz of frequency regions of the absorption-of-sound layer 21 uses the ingredient adjusted to 30 - 90% in thickness the o'clock of 20mm.

[0051] In this operation gestalt, it is fabricated by the configuration of the request which met the field configuration of a dash panel 10 with cold-press-molding metal mold with a desired metal mold configuration, after mixing low-melt point point PET in playback PET fiber as a binder, being fabricated by press working of sheet metal in the shape of [desired] a mat after heat-treating what was accumulated in the shape of a mat on the conveyor belt and carrying out heating softening of this original fabric mat.

[0052] In addition, it is fabricated in that into which thermosetting resin was infiltrated as a binder by the necessary configuration using hot pressing.

[0053] If it consists of the fiber aggregates which thermoplastics or thermosetting resin is sufficient as as a binder, and were excellent in sound absorption characteristics in this invention as explained above, neither the quality of the material nor especially a shaping method of construction will be limited.

[0054] Thus, it becomes what was excellent also in the workability which attaches the insulator dash 20 in a dash panel 10 while it can mitigate product weight sharply and can raise fuel consumption effectiveness by this lightweight-ization, since the insulator dash 20 for automobiles concerning this invention can abolish noise insulation layers, such as a rubber sheet with which the conventional weight increases since it consists of absorption-of-sound layer 21 monolayers, or a vinyl chloride sheet.

[0055] Furthermore, the insulator dash 10 concerning this invention writes as an absorption-of-sound layer 21 monolayer configuration, and demonstrates the

absorption-of-sound mechanism shown in drawing 2 .

[0056] That is, a part insulates the noise (inside F1 of drawing) generated in an engine room E with a dash panel 10, and the remainder invades in the absorption-of-sound layer 21 as noise (inside F2 of drawing).

[0057] And it becomes the recursive transparency noise (the inside F5 of drawing) which the transparency noise (inside F3 of drawing) which remains invades in an instrument panel 40, is reflected in the inside of an instrument panel 40, and this reflective noise (inside F4 of drawing) penetrates in the absorption-of-sound layer 21 again, and it absorbs sound by the absorption-of-sound function of an absorption-of-sound layer 21 as a result of absorption of sound of noise [a part of] shown by the above F2 by the absorption-of-sound function of the absorption-of-sound layer 21.

[0058] Thus, while absorbing sound a part of noise spread to an interior-of-a-room side through a dash panel 10 by adopting an absorption-of-sound layer 21 monolayer configuration, the transparency noise which penetrates the absorption-of-sound layer 21 and is penetrated to the vehicle interior of a room is reflected in an instrument panel 40, and the transmitted sound which was not decreased in the instrument panel 40 can be effectively prevented by decreasing this reflective noise by the absorption-of-sound layer 21 again.

[0059] As the graph of drawing 3 shows, absorption-of-sound / noise insulation engine performance (a) of the insulator dash 20 by absorption-of-sound layer 21 monolayer the sound isolation property of the above-mentioned insulator dash 20 It is **** of the noise insulation engine performance (b) of an instrument panel 40, absorption-of-sound / noise insulation engine performance (c) by the absorption-of-sound layer 21, and the absorption-of-sound engine performance in an instrument panel 40 (d), and it is in ** from a graph that the noise of the frequency region level in inside compass and a loud-sound region can be decreased especially effectively.

[0060] in order that, [subsequently,] drawing 4 may show the modification of the above-mentioned insulator dash 20 and may raise the absorption-of-sound nature in an instrument panel 40 -- the instrument-panel 40 bottom -- instrumental -- undercover one -- 41 is installed, it is the description to have made the inside of an instrument panel 40 into a closed space, by this, the absorption-of-sound engine performance in an instrument panel 40 can be raised more, and improvement in a sound isolation property can be expected further.

[0061] Subsequently, drawing 5 thru/or drawing 7 show the 2nd operation gestalt of this invention, and the epidermis layer 22 to which the insulator dash 20 in this 2nd operation gestalt is from the fiber aggregate on the front-face side of the absorption-of-sound layer 21 is unified.

[0062] It is the description that the epidermis layer 22 is set as high density rather than the absorption-of-sound layer 21 that the thing of the same configuration as the 1st operation gestalt should just be used for the absorption-of-sound layer 21.

[0063] Surface density intercepts a part by less than two 0.005 - 0.3 kg/m to the noise in which this epidermis layer 22 invades in the absorption-of-sound layer 21 through an engine room E to the dash panel 10 by the quality of the material of the epidermis

layer 22 consisting of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), and absorbs sound a part. And the transparency noise which penetrated the epidermis layer 22 is reflected by the inside of an instrument panel 40, and it can prevent certainly that it is filled in an instrument panel 40, and a sound is made in order to invade in the absorption-of-sound layer 21 and to absorb sound through the epidermis layer 22 again.

[0064] Moreover, in this operation gestalt, although the epidermis layer 22 has been arranged to the front-face side of the absorption-of-sound layer 21, the epidermis layer 22 laminates the epidermis layer 22 in a part of absorption-of-sound layer 21 partially with the **** property of a car by uniting with a dash panel 10 side, i.e., the rear face of the absorption-of-sound layer 21, and it is good also considering the part which remains as absorption-of-sound layer 21 monolayer.

[0065] And the average sound absorption coefficient of the insulator dash 20 which consists of an absorption-of-sound layer 21 and an epidermis layer 22 performs an ingredient setup so that it may become 15 - 95%, and it is taken as 630-4000Hz average of normal incidence sound absorption coefficients in that case. Moreover, the thickness of the epidermis layer 22 is 15mm, and the thickness of the insulator dash 20 is set up among 5-150mm.

[0066] Furthermore, what is necessary is to heat-treat by making hot melt powder adhere to the plane of composition of the epidermis layer 22, to carry out the laminating of the epidermis layer 22 beforehand formed in the shape of a mat where hot melt is fused, and just to unify by cold press molding, after sprinkling fibrin in the shape of a conveyor with a card ring, being accumulated in the shape of a mat as a shaping method of construction of the absorption-of-sound layer 21 and the absorption-of-sound layer 22 and creating the original fabric mat of the absorption-of-sound layer 21.

[0067] And it turns out that the sound isolation engine performance (a) of the insulator dash 20 is what ****(ed) three persons of the absorption-of-sound engine performance (d) in the insulation (b) of an instrument panel 40, the absorption-of-sound nature of the insulator dash 20, insulation (c), and an instrument panel 40, and the good sound isolation engine performance in 630-4000Hz is obtained in the sound isolation engine performance of the insulator dash 20 in this 2nd operation gestalt as the graph of drawing 6 shows.

[0068] In addition, as a presentation of the insulator dash used for this measurement, the thing of PET fiber 1.2 kg/m² was used as an absorption-of-sound layer 21 as 2.0kg of PET fiber/, m², and an epidermis layer 22.

[0069] Thus, as lightweight-ization is attained and fuel consumption effectiveness is raised, and it is shown in the graph of drawing 6 mentioned above while having the same operation effectiveness as the 1st operation gestalt that attachment workability will also become good since the noise insulation layer in which the conventional weight increases can be abolished also in the insulator dash 20 in the 2nd operation gestalt, the outstanding sound isolation engine performance is obtained.

[0070] furthermore, it is shown in drawing 7 -- as -- the 2nd operation gestalt -- also setting -- the instrument-panel 40 bottom -- instrumental -- undercover one -- the absorption-of-sound engine performance in an instrument panel 40 can be raised by

making the inside of an instrument panel 40 into a closed space by attaching 41.

[0071] Drawing 8 thru/or drawing 10 show the 3rd operation gestalt of this invention, the same sign is given to the same part as the 1st and 2nd operation gestalt mentioned above, and detailed explanation is omitted.

[0072] As shown in drawing 8, the layered product which laminated hot melt film 23b is used for the nonwoven fabric 23a rear face as an epidermis layer 23 by which the laminating of the insulator dash 20 in this operation gestalt is carried out to the front-face side of the absorption-of-sound layer 21.

[0073] The above-mentioned nonwoven fabric 23a is made from polyester fiber, metsuke amount is set as 10 - 100 g/m², hot melt film 23b functions as an adhesion medium, and the thing with a thickness of 10-100 micrometers is used.

[0074] Furthermore, as the relation between the absorption-of-sound layer 21 and the epidermis layer 23 is shown in drawing 9, the epidermis layer 23 is fabricated by concave convex, the crevice of the epidermis layer 23 is formed in two or more places, it is set up as jointing 24 of the absorption-of-sound layer 21 and the epidermis layer 23, and the area S1 of this jointing 24 is 2 0.5-100cm.

[0075] Moreover, the heights of the epidermis layer 23 are equivalent to an air space 25, the area S2 of this air space 25 is 2 1-100cm, and height h of an air space 25 is 1-10mm.

[0076] And since a product front face is fabricated by concave convex, it is equivalent to heights and the air space 25 between the absorption-of-sound layer 21 and the epidermis layer 23 is formed so that it may illustrate, the epidermis layer 23 stops being torn easily due to the buffer action of this air space 25, and the workability with a group to a car-body panel improves.

[0077] Furthermore, the curvature by the difference of contraction between the absorption-of-sound layer 21 and the epidermis layer 23 is suppressed, and the fit nature to a panel also improves.

[0078] Moreover, since the surface area of the epidermis layer 23 is increasing to the noise from an interior-of-a-room side while Siwa etc. cannot be conspicuous and being able to raise the appearance engine performance, since it is on irregularity, the absorption-of-sound engine performance of a product front face improves.

[0079] Next, about the shaping approach of the insulator dash 20 shown in drawing 8 and drawing 9, if it explains based on drawing 10, the shaping metal mold 50 consists of a shaping punch 51 and shaping female mold 52, countless vacuum suction hole 51a is established in the mold face of the shaping punch 51, and while the vacuum suction device which is not illustrated is attached, the mold face of the shaping punch 51 is set as the concave convex 53 corresponding to product irregularity. On the other hand, blow hole 52a is established innumerable and the Ayr blow device which is not illustrated is attached to the mold face of the shaping female mold 52.

[0080] And while supplying in the shaping metal mold 50 and mold clamp carrying out of the shaping vertical molds 51 and 52 after carrying out the epidermis layer 23 with the infrastructure heating furnace and carrying out heating softening processing of the absorption-of-sound layer 21 with a hot blast heating furnace when the shaping metal mold 50 is in a mold aperture condition The insulator dash 20 which formed the air space 25 which floated the epidermis layer 23 from the absorption-of-sound layer

21 can be fabricated by carrying out vacuum suction of the epidermis layer 23 from the shaping punch 51, and supplying Ayr in the absorption-of-sound layer 21 from the shaping female mold 52.

[0081] As drawing 11 thru/or drawing 15 show the 4th operation gestalt of this invention and shows it to drawing 11 , as for the insulator dash 20 in this operation gestalt, the film layer 26 is united with the front-face side of the absorption-of-sound layer 21.

[0082] Therefore, while lightweight-ization can be attained and being able to raise attachment workability by abolishing noise insulation layers, such as a rubber sheet with which the conventional weight increases also in this operation gestalt, and a vinyl chloride sheet The transparency noise which penetrates the absorption-of-sound layer 21 and the film layer 26, and invades in an instrument panel 40 like the above-mentioned operation gestalt Since it is reflected by instrument-panel 40 inside, it invades again in the film layer 26 and the absorption-of-sound layer 21 and acoustic treatment is carried out, In order to have prevented the sound build-up in an instrument panel 40, for the noise to have not echoed, to have the same operation effectiveness of raising the silence of the vehicle interior of a room and to unite the film layer 26 with the absorption-of-sound layer 21 on structure, structure is simple and manufacture is also easy structure.

[0083] The unification with this film layer 26 and the absorption-of-sound layer 21 can consider the various variations shown in drawing 12 by the **** property of a car, or the sound absorption characteristics of the absorption-of-sound layer 21.

[0084] Drawing 12 (a) is what united the film layer 26 with the front-face side of the absorption-of-sound layer 21. Drawing 12 (b) Although it is the configuration which covered the perimeter of the absorption-of-sound layer 21, and was surrounded by the film layer 26, drawing 12 (c) is the configuration which intervened the air space 25 and has arranged the film layer 26 in part to the front face of the absorption-of-sound layer 21, and both sides on the back and drawing 12 (d) unites the film layer 26 with the front face of the absorption-of-sound layer 21 It is the configuration which prepared opening 26a in the film layer 26 in part, and covered the absorption-of-sound layer 21 with the film layer 26 partially.

[0085] What is necessary is to lay the film layer 26 on top of the original fabric mat of this absorption-of-sound layer 21, and just to unite with it after heating softening processing, after carrying out coating processing of the hot melt system powder in using the absorption-of-sound layer 21 used for the 1st operation gestalt and the 2nd operation gestalt as a method of construction which unites the film layer 26 with the above-mentioned absorption-of-sound layer 21.

[0086] In addition, as the above-mentioned film layer 26, the quality of the material can also use those complex for a polyolefine system resin film, a polyurethane system resin film, a polyester system resin film, paper, etc., and a 10 micrometers - 200 micrometers thing is used for the thickness of the film layer 26. Moreover, the film layer 26 does not ask the existence of permeability, but, as for this film layer 26, is effective in preventing that the fiber waste of the absorption-of-sound layer 21 etc. is outside omitted.

[0087] And when the film layer 26 equipped with permeability is used especially as a film layer 26, it is possible to be able to intercept a part of transmitted sound from an engine room E, to incorporate again the transparency noise in the instrument panel 40 penetrated further in the

absorption-of-sound layer 21, and to absorb sound the reflective noise.

[0088] A graph shows the sound isolation property of the insulator dash 20 in the 4th operation gestalt by drawing 13 .

[0089] And also in this 4th operation gestalt, the total sound isolation property (a) of the insulator dash 20 is **** of the insulation (b) of an instrument panel 40, the absorption-of-sound nature of an insulator, insulation (c), and the absorption-of-sound nature in an instrument panel 40 (d), and it can expect the good absorption-of-sound nature in 630-4000Hz that the graph of drawing 13 shows.

[0090] furthermore, the 4th operation gestalt is shown in drawing 14 -- as -- the instrument-panel 40 bottom -- instrumental -- undercover one -- the absorption-of-sound nature in an instrument panel 40 can be raised by making the inside of an instrument panel 40 into a closed space by preparing 41.

[0091] Furthermore, as shown in drawing 15 , the film layer 26 is floated in part from the absorption-of-sound layer 21, you may make it form an air space 25, and the ingredient which laminated the hot melt film as a glue line fits the rear face of a nylon (polyamide) resin film in consideration of thermal resistance and a moldability as a film layer 26 in that case.

[0092] In addition, the configuration of jointing 24 or an air space 25 of the shaping approach is the same as that of the time of the epidermis layer 23 of the 3rd operation gestalt that what is necessary is just to use the shaping metal mold 50 shown in drawing 10 .

[0093] Finally, the 5th operation gestalt of this invention is explained along with drawing 16 . With this operation gestalt, the foaming resin sheet material is used as an epidermis layer 27. For example, by foaming form material, such as olefin system foaming resin and EPDM, it is a surface density 0.005 - less than two 0.3 kg/m thing, and, as for thickness, the thing 15mm or less is suitable.

[0094] And also in this operation gestalt, since it is the configuration which uses a foaming resin sheet material as an epidermis layer 27,-izing of the insulator dash 20 can be carried out [lightweight], and workability and fuel consumption effectiveness can be raised.

[0095] Moreover, as an epidermis layer 27, when the form material of independent foaming structure is used, the noise indoor by cutoff of the transmitted sound from an engine room E and absorption of sound of the sound in the instrumental 40 which penetrated the insulator dash 20 can be mitigated.

[0096] On the other hand, when the form material of continuation foaming structure is used, absorption of sound of the sound in the instrumental 40 which penetrated the insulator dash 20 compared with cutoff of the transmitted sound from an engine room E can be made to think as important as an epidermis layer 27.

[0097] As mentioned above, although the operation gestalt of the insulator dash 20 for automobiles was explained, it is applicable to the insulator at large [for automobiles] with which a car-body panel is equipped.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the sectional view in which showing the 1st operation gestalt of this invention, and showing the condition of having attached the insulator dash for automobiles in the dash panel.

[Drawing 2] It is the explanatory view showing the absorption-of-sound mechanism of

the insulator dash for automobiles shown in drawing 1 .

[Drawing 3] It is the graph which shows the sound isolation property in the insulator dash for automobiles shown in drawing 1 .

[Drawing 4] It is the explanatory view showing the modification of an insulator dash shown in drawing 1 .

[Drawing 5] It is the sectional view in which showing the 2nd operation gestalt of this invention, and showing the condition of having attached the insulator dash for automobiles in the dash panel.

[Drawing 6] It is the graph which shows the sound isolation property in the attachment structure of an insulator dash shown in drawing 5 .

[Drawing 7] It is the explanatory view showing the modification of the insulator dash for automobiles shown in drawing 5 .

[Drawing 8] It is the sectional view in which showing the 3rd operation gestalt of this invention, and showing the condition of having attached the insulator dash for automobiles in the dash panel.

[Drawing 9] It is the sectional view showing the important section of the insulator dash for automobiles shown in drawing 8 .

[Drawing 10] It is the explanatory view showing the shaping metal mold of the insulator dash for automobiles shown in drawing 8 .

[Drawing 11] It is the sectional view showing the condition of having attached the insulator dash for automobiles in the 4th operation gestalt of this invention in the dash panel.

[Drawing 12] It is each explanatory view showing the variation of the film layer in the insulator dash for automobiles shown in drawing 11 .

[Drawing 13] It is the graph which shows the sound isolation property in the insulator dash for automobiles shown in drawing 11 .

[Drawing 14] It is the explanatory view showing the modification of the insulator dash for automobiles shown in drawing 11 .

[Drawing 15] It is the explanatory view showing the modification of the insulator dash for automobiles shown in drawing 11 .

[Drawing 16] It is the sectional view showing the condition of having attached the insulator dash for automobiles in the 5th operation gestalt of this invention in the dash panel.

[Drawing 17] It is the explanatory view showing the arrangement configuration of the conventional insulator dash.

[Drawing 18] It is the sectional view showing the configuration of the conventional insulator dash.

[Drawing 19] It is the explanatory view showing the sound isolation mechanism in the conventional insulator dash.

[Description of Notations]

10 Dash Panel

10a Dash upper section

10b Dash lower section

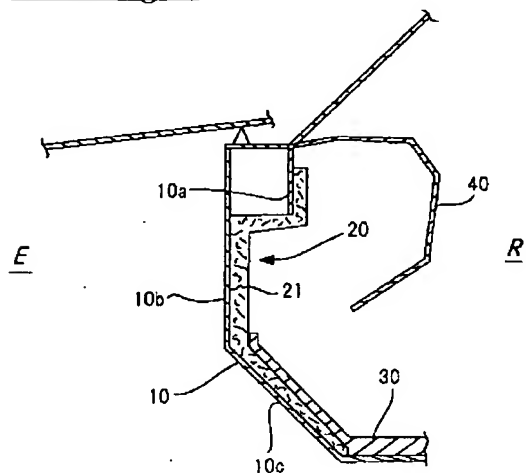
10c Toeboard section

20 Insulator Dash for Automobiles

21 Absorption-of-Sound Layer
 22, 23, 27 Epidermis layer
 24 Jointing
 25 Air Space
 26 Film Layer
 30 Floor Carpet
 40 Instrument Panel
 41 Instrumental -- Undercover One
 50 Shaping Metal Mold
 51 Shaping Punch
 52 Shaping Female Mold

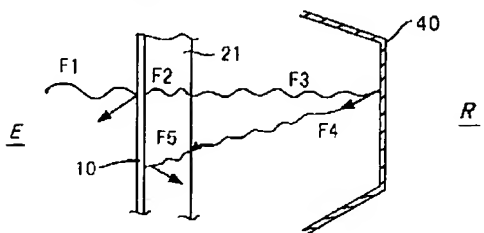
DRAWINGS

[Drawing 1]



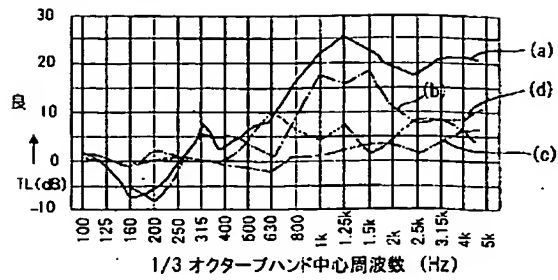
- | | |
|--------------------|----------------|
| 10 ダッシュパネル | 25 空気層 |
| 10a ダッシュアッパー部 | 26 フィルム層 |
| 10b ダッシュローア部 | 30 フロアカーペット |
| 10c トーボード部 | 40 インストルメントパネル |
| 20 自動車用インシュレータダッシュ | 41 インストアンダーカバー |
| 21 吸音層 | 50 成形金型 |
| 22, 23, 27 表皮層 | 51 成形上型 |
| 24 接着部 | 52 成形下型 |

[Drawing 2]



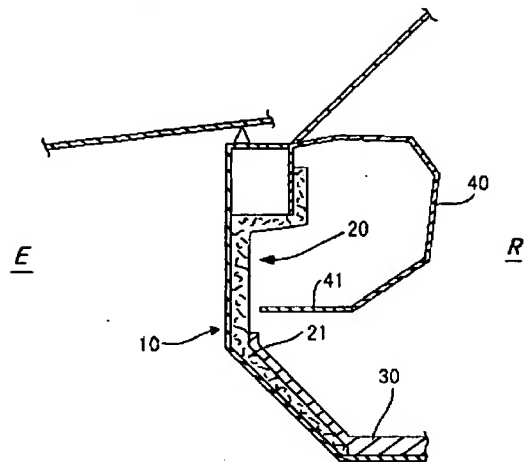
[Drawing 3]

◇ 表皮レス仕様

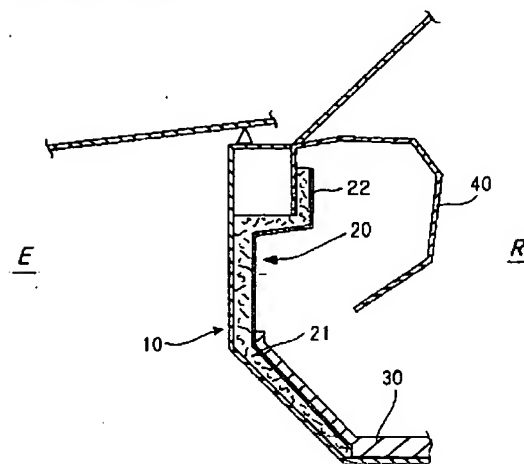


—	(2) インスト、インシュレータ吸遮音	(a)
- - -	(3) インスト遮音	(b)
...	(4) インシュレータ吸遮音	(c)
- · - ·	(5) インスト内吸音	(d)

[Drawing 4]

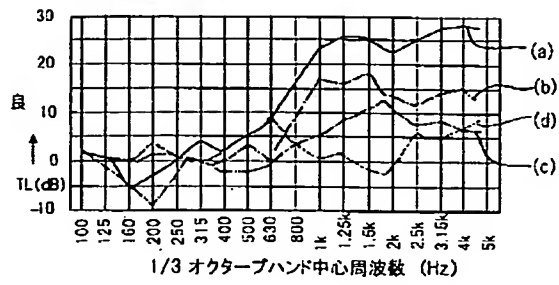


[Drawing 5]



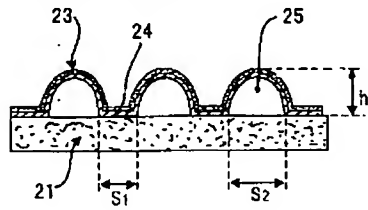
[Drawing 6]

◇ 通気型仕様

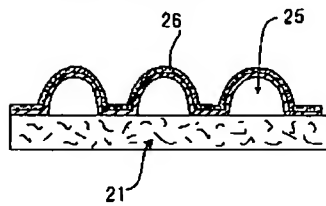


——	(2) インスト・インシュレータ吸音音	(a)
- - - -	(3) インスト透音	(b)
.....	(4) インシュレータ吸音音	(c)
- · - · - ·	(5) インスト内吸音	(d)

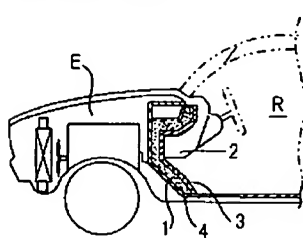
[Drawing 9]



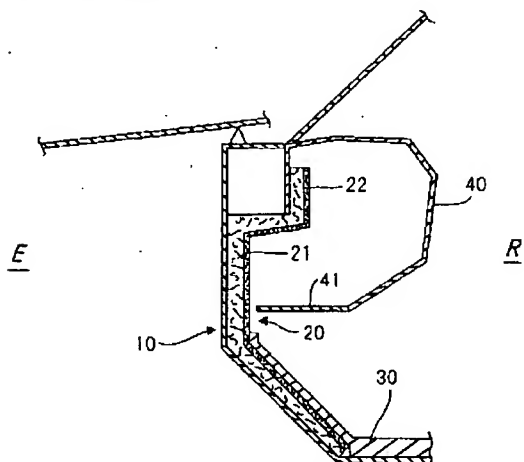
[Drawing 15]



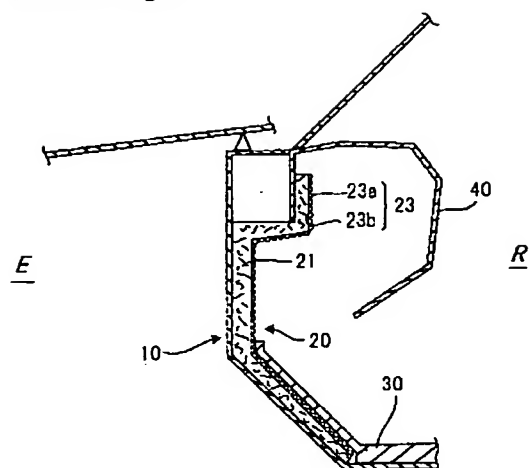
[Drawing 17]



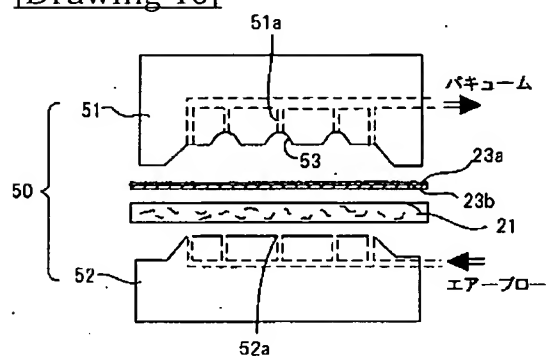
[Drawing 7]



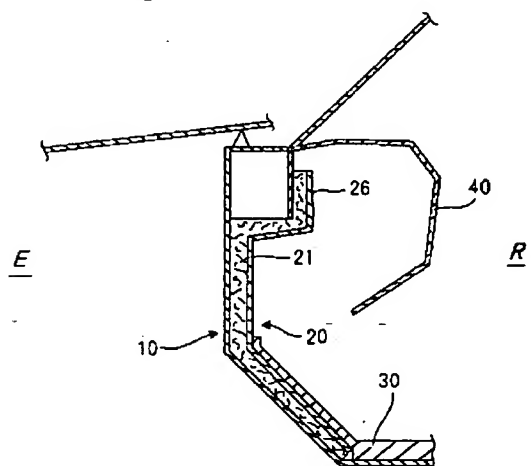
[Drawing 8]



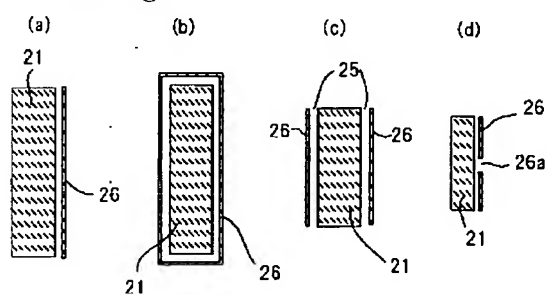
[Drawing 10]



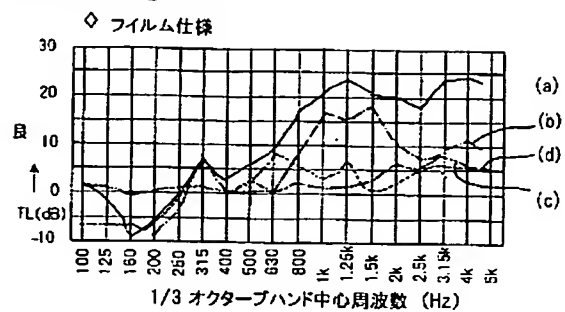
[Drawing 11]



[Drawing 12]

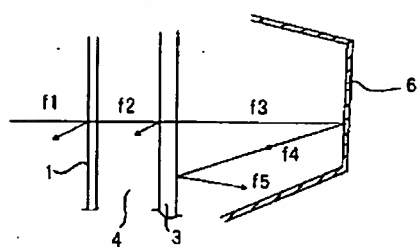


[Drawing 13]

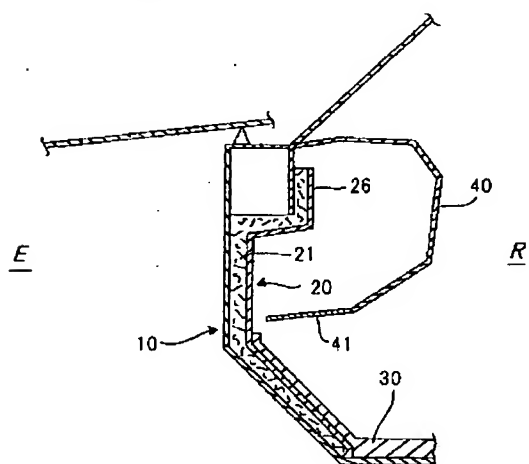


—	(2) インスト、インシュレータ吸音音	(a)
- - -	(3) インスト遮音	(b)
...	(4) インシュレータ吸音音	(c)
- · - · -	(5) インスト内吸音	(d)

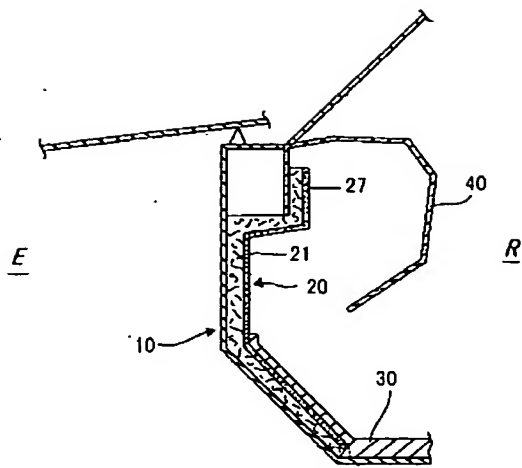
[Drawing 19]



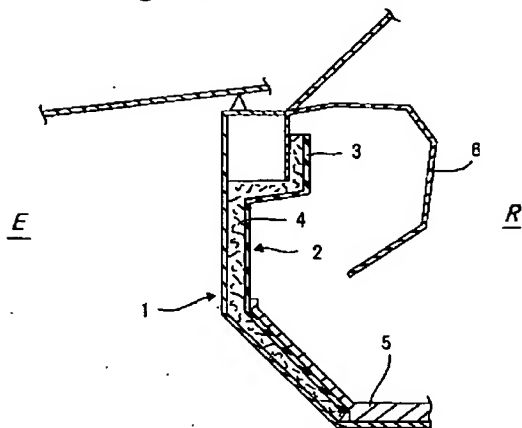
[Drawing 14]



[Drawing 16]



[Drawing 18]



CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law

[Section partition] The 5th partition of the 2nd section

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[Application number] Application for patent 2001-14434 (P2001-14434)

[The 7th edition of International Patent Classification]

B60R 13/08

[FI]

B60R 13/08

[Procedure revision]

[Filing Date] April 26, Heisei 16 (2004. 4.26)

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] 0015

[Method of Amendment] Modification

[The contents of amendment]

[0015]

Here, the quality of the material of an epidermis layer consists of the fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.), by surface density 0.005 - less than two 0.3 kg/m, the thickness of an epidermis layer is 15mm or less, and the epidermis layer is set as high density from the absorption-of-sound layer.

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] 0023

[Method of Amendment] Modification

[The contents of amendment]

[0023]

Here, the area of jointing of the epidermis layer per concave heights and an absorption-of-sound layer is [the height of 2 and an air space of the area of an air space] 1-10mm 1-100cm in 2 0.5-100cm.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0030

[Method of Amendment] Modification

[The contents of amendment]

[0030]

1-10mm is [the area of jointing of the film layer per concave heights, and an absorption-of-sound layer] in addition, suitable [as for the height of 2 and an air space] for the area of 2 and an air space 1-100cm 0.5-100cm.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0037

[Method of Amendment] Modification

[The contents of amendment]

[0037]

Here, as a foaming resin web material, an olefin system foaming sheet, EPDM, etc. can be used and 15mm or less of thickness is good at surface density 0.005 - less than two 0.3 kg/m.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0050

[Method of Amendment] Modification

[The contents of amendment]

[0050]

That is, the insulator dash 20 was taken as the absorption-of-sound layer 21 monolayer configuration which consists of the fiber aggregate. This absorption-of-sound layer 21 should consist of a fiber aggregate which made fibrous the felt, PET (polyester) fiber, and papers (pulp etc.) as that quality of the material, and should use thermoplastics or thermosetting resin as a binder. Fabricated in accordance with the field configuration of a dash panel 10, the thickness of the

absorption-of-sound layer 21 is 5-150mm, and the surface density is set as two or less 3.0 kg/m, and uses the ingredient with which the average sound absorption coefficient of 630-4000Hz of frequency regions of the absorption-of-sound layer 21 was adjusted to 30 - 90% in thickness the o'clock of 20mm.

[Procedure amendment 6]

[Document to be Amended] Specification

[Item(s) to be Amended] 0059

[Method of Amendment] Modification

[The contents of amendment]

[0059]

As the graph of drawing 3 shows, absorption-of-sound / noise insulation engine performance (a) of the insulator dash 20 according the sound isolation property of the above-mentioned insulator dash 20 to absorption-of-sound layer 21 monolayer is total of the noise insulation engine performance (b) of an instrument panel 40, absorption-of-sound / noise insulation engine performance (c) by the absorption-of-sound layer 21, and the absorption-of-sound engine performance in an instrument panel 40 (d). It is in ** from a graph that the noise of the frequency region level in inside compass and a loud-sound region can be decreased especially effectively.

[Procedure amendment 7]

[Document to be Amended] Specification

[Item(s) to be Amended] 0065

[Method of Amendment] Modification

[The contents of amendment]

[0065]

And the average sound absorption coefficient of the insulator dash 20 which consists of an absorption-of-sound layer 21 and an epidermis layer 22 performs an ingredient setup so that it may become 15 - 95%, and it is taken as 630-4000Hz average of normal incidence sound absorption coefficients in that case. Moreover, the thickness of the epidermis layer 22 is 15mm or less, and the thickness of the insulator dash 20 is set up among 5-150mm.

[Procedure amendment 8]

[Document to be Amended] Specification

[Item(s) to be Amended] 0066

[Method of Amendment] Modification

[The contents of amendment]

[0066]

Furthermore, what is necessary is to heat-treat by making hot melt powder adhere to the plane of composition of the epidermis layer 22, to carry out the laminating of the epidermis layer 22 beforehand formed in the shape of a mat where hot melt is fused, and just to unify by cold press molding, after sprinkling fibrin in the shape of a conveyor with a card ring, being accumulated in the shape of a mat as a shaping method of construction of the absorption-of-sound layer 21 and the absorption-of-sound layer 22 and producing the original fabric mat of the absorption-of-sound layer 21.